

Functional Academics for Students with Mental Retardation

- A Guide for Teachers

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Department of Special Education

NATIONAL INSTITUTE FOR THE MENTALLY HANDICAPPED

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JUST A MOMENT

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Writing of this book had been a challenging task. Presenting it in the form in which you are reading now has gone through a number of stages involving writing, typing, proof reading, administrative sanction for printing, illustrations for art work, the process of printing itself and getting it ready for dissemination. A number of people were involved, without whose support and cooperation this task would not have been completed. The constant support and encouragement all the way through by Dr.D.K.Menon, Director, NIMH is gratefully acknowledged without which the book could not have been published today. The prompt and unfailing secretarial assistance by Shri A.Venkateswara Rao all the way through in typing the number of proofs patiently and coordinating wherever required is acknowledged with gratitude and appreciation. We are thankful to Mrs.K.Aruna, Clinical Assistant for the help in developing the Hindi and Telugu wordlists with great care. The draft book took its final printed shape because of the administrative support provided at the Institute. The support provided by Shri L.Govinda Rao, Deputy Director (Admn.) in printing the book is gratefully acknowledged. We are particularly thankful to Mr.G.V.Reddy, Asst.Admn.Officer (Acad.) for promptly getting the official procedures done for printing the book on time. Our thanks are due to Mr.T.Pitchaiah, Accounts Officer for the support in printing the book. Last, but not the least, we thank the students of Special Education Centre at NIMH for providing their 'hand work' for development of the cover page for the book.

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सचिव

भारत सरकार

सामाजिक न्याय और

अधिकारिता मंत्रालय

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SECRETARY

GOVERNMENT OF INDIA

MINISTRY OF SOCIAL

JUSTICE & EMPOWERMENT

NEW DELHI

FOREWORD

The special education of children with mental retardation has come a long way at the turn of the century. From the total rejection from school system in the pre-independence India, movement towards acceptance of children with mental retardation in education stream with various educational provisions is an achievement in recent years. It is well known that the earlier efforts towards education of mentally retarded persons were predominantly voluntary efforts teaching them by trial and error methods. Today there are a number of special schools with qualified special educators, training children with mental retardation in India. Pre-independence India had less than 10 schools for mentally retarded children while after 50 years of Independence we have over 850 special schools in the country which is a great achievement. When the schools increased and the programmes were to be provided, dearth of qualified special teachers was felt as a major requirement. The National Institute for the Mentally Handicapped has taken up on priority, the generation of manpower in the form of special teachers to reach out to the children with mental retardation in special schools.

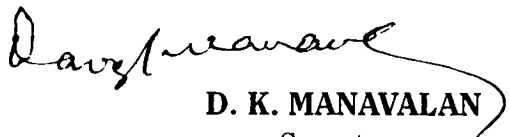
The qualified special teachers still had problems of acquiring the right kind of materials and resource manuals for reference and assistance as they were working in the field. The initial efforts on developing

materials for training parents was not sufficient to assist classroom teachers in teaching academics to children with mental retardation. It is also a fact that the academic content for children with mental retardation is not the same as the children with other disabilities because of the limited intellectual capacity of the retarded children.

Therefore, the curriculum has to be absolutely functional and activity oriented which demands considerable time and effort from the teachers. Further, learning functional academic skills for children with mental retardation is necessary for independent living and successful employment. Many mentally retarded individuals can earn and contribute to their families if they are trained suitably in various tasks which are functional and need based.

Taking into account the above facts, this book "Functional academics for students with mental retardation - A guide for teachers" has been developed which contain information and know-how of teaching functional academics including functional reading, writing and arithmetic to children with mental retardation. It also gives tips to teachers on how to give certain skills for those who cannot read and write and yet be functioning competently in the society. This book is the first of its kind in the country geared towards teaching functional academics and it is a good reference book not only for teachers of the mentally retarded persons but for all those who work with people with mental retardation.

Date: 29th June, 1998



D. K. MANAVALAN
Secretary
Government of India
Ministry of Social
Justice & Empowerment
New Delhi

PREFACE

The National Institute for the Mentally Handicapped was established by the Central Government in the year 1984 with the objective to promote human resource development in the field of mental retardation. During the first decade, the Institute concentrated on developing materials and manuals for professionals, parents and general public. As of today, the Institute has more than sixty publications to its credit which are used by the professionals all over the country.

During the year 1994, one of the projects taken up by the Institute was “Development of resource materials for teaching persons with mental retardation”. The objective of this project was to develop teaching learning materials specifically to teach persons with mental retardation keeping in view the current teaching strategies. As a part of the project the Institute has brought out workbooks and flipbooks for teaching, reading, writing and arithmetic. In addition, twelve units of learning materials were developed to teach reading, writing, number, time and money concepts. All the materials and workbooks have been field tested and found to be useful. The material can be used in wide variety of situations such as special school, special class in a regular school and inclusive education set up in general schools for children with mental retardation and slow learners.

The field of special education has grown rapidly during the past two decades. Significant initiatives have been taken in our country for supporting special schools and integrated education programmes. Experience has shown that continuing education is necessary to keep the teacher abreast with latest developments in the field. Orientation courses and short term courses are also required for learning specific strategies and use of learning materials for effectively training children

with mental retardation. NIMH conducts nearly forty short term courses. The principals and teachers are welcome to attend any of the short term courses listed in the calendar of activities for the given academic year.

This Guide for teachers on functional academics brought out by the Institute is designed to train children with mental retardation and slow learners in special school and general school settings. The guide gives steps for systematic training for developing functional literacy. This guide when used in combination with other materials brought out by the Institute is expected to serve as tools which a teacher can use in daily teaching programmes. Learning materials have been designed to promote active interaction between the learner and the teacher. This guide for teachers is the first of its kind brought out by the Institute for facilitating teachers in implementing individualised as well as group instruction in the classroom. The users are most welcome to send their comments and feedback on the Guide, the learning materials and workbooks. We at NIMH will be happy to incorporate the changes if required. It is hoped that children with mental retardation will enjoy the learning environment and become part of the mainstream.

Dated : August 4, 1998

A handwritten signature in black ink, appearing to read 'D. K. Menon', written over a horizontal line.

Dr. D. K. MENON
Director, NIMH

Just a moment.....

Eradication of illiteracy has been the priority goal of the World in recent years. Education For All by 2000 AD is a Declaration of UNESCO towards which all nations are working with enthusiasm and commitment. Needless to say, education for all includes children with special needs. Literacy skills of the mentally retarded individuals are not the same as children with other special needs due to the limited intellectual capacity. However, mentally retarded individuals can use literacy and numeracy skills to some extent which are application oriented if they are given the right kind of training.

Traditionally the mentally retarded children used to receive reading and writing skills like any other primary school child, beginning with saying and writing of alphabets and numbers by rote, following requirements in the textbooks. It was observed that as days passed by, the retarded children had the ability to write in sequence, the alphabets or numbers, but did not have the ability to use them appropriately when there was a requirement. For instance, a retarded child may identify alphabets independently or in 3 or 4 letter words as taught by the teacher in the classroom. If the same words were seen elsewhere in his environment, he had difficulty in identifying and reading them. Similarly, he may write numbers in sequence upto 100 and beyond, but may not know the value of 13 and 20 as to which is bigger and which is smaller. Teachers and parents used to be satisfied by saying that the child is able to write pages after pages of the given material. They do not note the fact that their children's learning is restricted to writing in the notebooks and

not of any use in their day-to-day living. One would agree that this kind of literacy is a waste of time and skill on the part of the teacher, the students and the family.

In recent years, new trends have emerged in the field of special education. Appropriate education of children emerged with focus on skills to be learnt that are absolutely function oriented. The current trend is ecology based curriculum development with activity based instructional programmes. In this approach, the emphasis is on utility of learnt skills which are age appropriate. Further, the instruction is more in the form of activities using materials and resources available in the environment. In other words, the instructional plan should include activities which lead to generalisation of learnt skills in various situations (home/school/neighbourhood/community). This approach helps in preparing persons with mental retardation to integrate smoothly into their own communities. This would mean that a mentally retarded student needs to be assessed not only for his current level of functioning but also the environment in which he lives. Based on this, content and instructional programme will be developed so that on learning the skills, the retarded person will definitely be able to use it in his environment effectively. In other words, the application of the learnt skills will be ensured. This is necessary as the education of students with mental retardation focuses on preparing them for independent living in their own environments in which they live.

It is well known that the ability to retain learnt skills is poor in persons with mental retardation unless they are put to use frequently. Thus, it is very important that items selected for

teaching should be such that they are required for day-to-day living of the person. As transfer of training is another difficulty in persons with mental retardation, whatever taught must be such that they are easily applicable in his environment and there is an ease in the use of the learnt skills by the retarded individual. A single answer to these problems stated above is the use of functional literacy and numeracy skills. By functional literacy and numeracy, it is meant here, that the retarded individuals are taught those reading and writing areas and mathematical concepts involving time, money and measurements which will be of use to them in their daily living. Numerous books provide lists of survival words for mentally retarded persons but the teachers in our country, who are working with the mentally retarded students for a numbers of years realise that the survival words in the western books are not exactly suitable for our conditions for obvious reasons including cultural, linguistic and socio-economic variations.

Considering the above points, this book attempts to provide methods for teaching functional reading and writing skills. Samples of words in Telugu, Hindi and English are also provided so that the experienced teachers can take the idea to apply to the respective language in their region. It is needless to say that the lists are not exhaustive but only samples and more needs to be added based on the requirement in various regions. The principle underlying teaching functional reading and writing are given in detail so that the teachers can use it suitably. The mathematics in this book includes teaching functional computation skills and time, money and measurements which are necessary for daily living. The measurements include capacity,

mass, weight, volume and distance. Examples, illustrations and tips given are essentially utility oriented in the day-to-day living and innovative teachers can always add more to it to suit the requirement in her teaching situation. Mathematical applications are highlighted with cross-reference to parallelly teaching mathematics alongwith reading and writing skills and its use in natural situations by the student. For instance, the child need not wait for learning all the numbers to recognise a one rupee coin or number '1' written on the clock. As and when number '1' is taught, generalising the same on door numbers, clock dials or recognition of one rupee coin and other relevant things is a possibility which is function oriented. Further, the child understands "WHY" he has learnt number '1' rather than just knowing the symbol as a vertical line.

The users are welcome to give their comments and suggestions for improvement of this book for future editions. The creative and innovative teachers can always add more to what is provided and make her teaching experience and students' learning experience enjoyable.

If EFA 2000 is our goal, literacy of children with mental retardation has to take a step in the direction of functional literacy and this is the first step towards it.

Vijayalakshmi Myreddi
Jayanthi Narayan

Chapter 1

Functional Reading and Writing

READING

Functional reading is defined as a student's actions or responses resulting from reading printed words (Brown and Perlmutter, 1971). **Functional** is the keyword as it is related to community validity. Hence, words selected for teaching reading must be functional as the ability to read allows learners to become more independent in community living. Further as stated by Polloway and Patton (1993), reading is the key to personal and social adjustment, and for successful involvement in community activities.

In early years, Kirk and Monroe (1948) outlined three goals that would help in developing a framework for teaching readers who are disabled, which holds good to this day.

- (a) The primary goal for all students who are mildly and moderately disabled is the ability to **read for protection**. Implicit in this goal is the concept of **survival**. Such

reading includes, directions, signboard, labels and symbols.

- (b) The second goal is reading for ***information and instruction*** - implied is functional reading that allows the individual to deal with job applications, newspaper advertisements, telephone books and the like.
- (c) The third goal is reading for ***pleasure***. This, for some disabled persons may be a realistic goal, which allows them to enjoy reading materials such as magazines, comics and story books. However, depending on the level of retardation and the ability to learn, the mentally retarded students may achieve one, two or all the above three goals.

Teaching Reading

A number of approaches have been identified for teaching reading (Aukerman, 1971). Often, an eclectic approach is necessary to meet the individual needs of a mentally retarded student. Some of the approaches popularly used are discussed below.

Sight word vocabulary (Whole word approach)

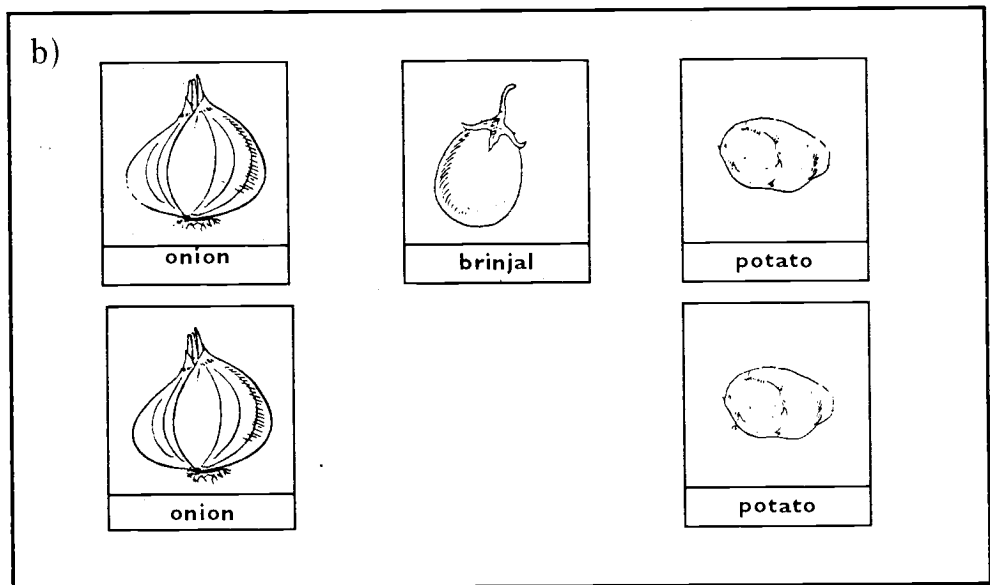
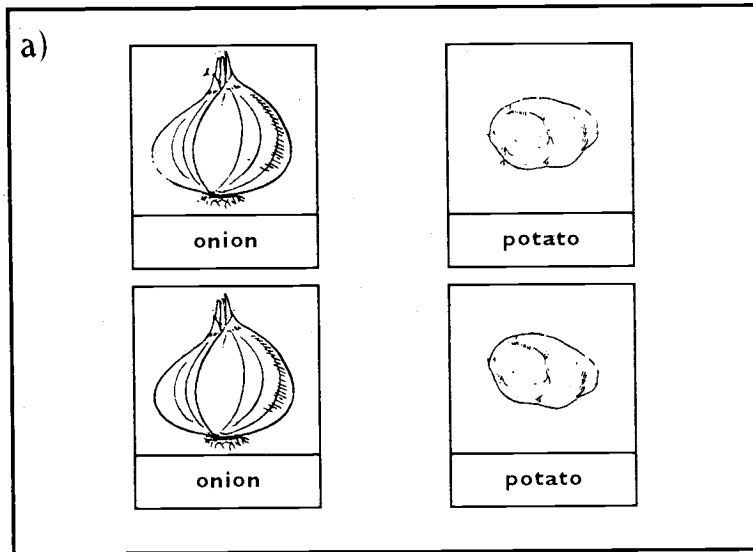
The approach that is found most successful in teaching functional reading skills is called the whole word approach. Through the whole word approach students learn to recognize and read words and later receive decoding instruction (to spell).

A variety of strategies have been used in teaching sight word vocabulary. Recent attention has been focused on the ***imagery level*** of the word to be learnt (Hargis, 1982). ***Imagery level refers to the ease with which a word evokes a concrete picture.*** High imagery words are usually concrete and include nouns such as ball, mango, fan and house. Low imagery words include abstract terms such as beautiful, good and have. In some instances, high imagery can be provided for low imagery words by using the word in context. For example, consider the word '***sweet***'. "***I ate mango. It is sweet***", becomes more concrete and students can remember better. Pairing of words with concrete objects and/or pictures will facilitate development of high imagery level in the students.

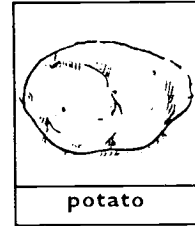
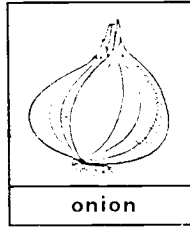
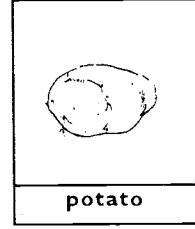
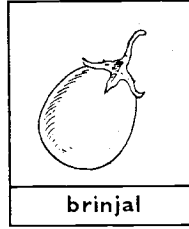
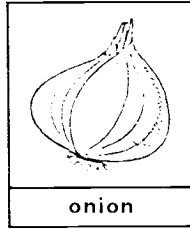
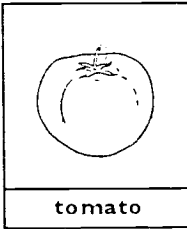
Follow these steps while using whole word approach

- Select the words which are commonly used (vegetables, fruits, furniture, clothes, body parts) in the immediate environment (at home and in school). To begin with select the words that grossly differ in sounds (banana, grapes; table, chair). Later introduce words, with some similarities ('banana, ball', 'grapes, goat').
- Start with a pairing activity using pictures with words. In the beginning, have two pictures with their names written for pairing and increase the number as the student shows progress.

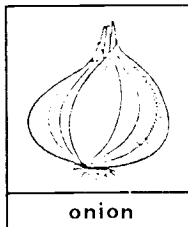
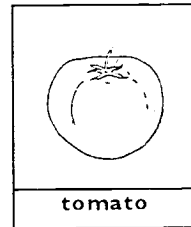
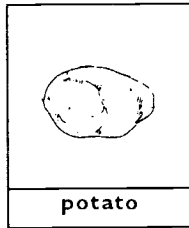
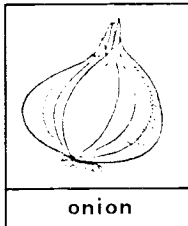
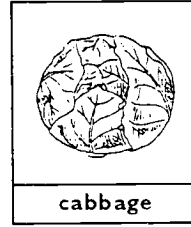
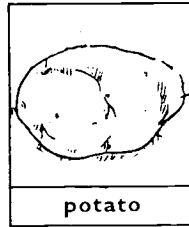
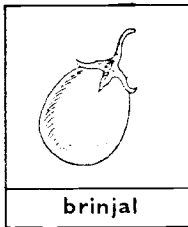
☆ For example : potato and onion.

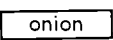
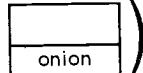


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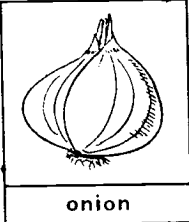
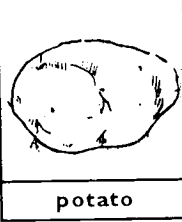


d))



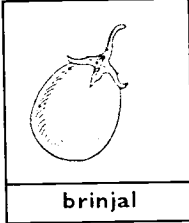
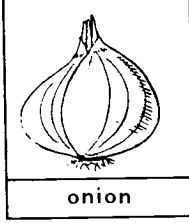
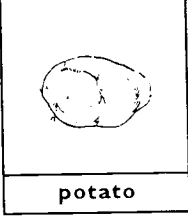
- As the students master the above steps use word cards () with the picture and word ()

a)

	
onion	potato

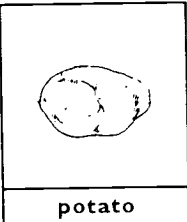
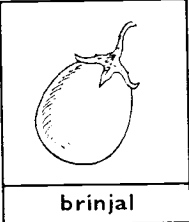
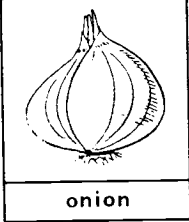
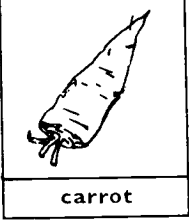
onion	potato
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b)

		
brinjal	onion	potato

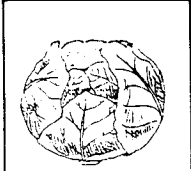
onion	potato
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c)


			
potato	brinjal	onion	carrot

potato	onion
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d)




cabbage

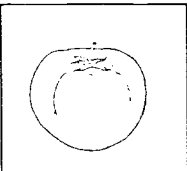


onion

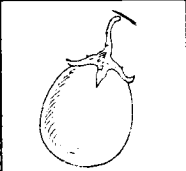
onion



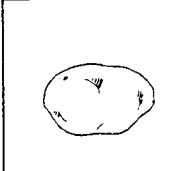
carrot



tomato



brinjal



potato

potato

- After the students learn the above steps, have only word cards (onion) without pictures for pairing

a)

onion

onion

potato

potato

b)

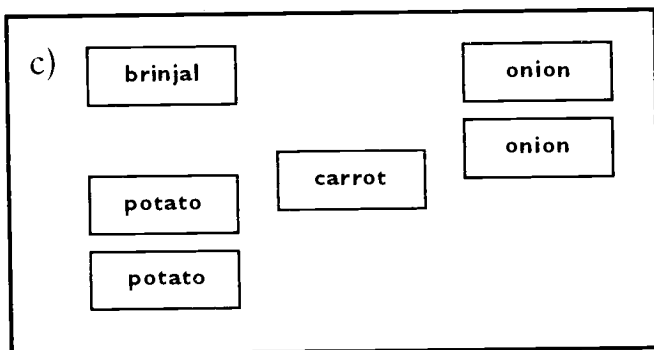
potato

potato

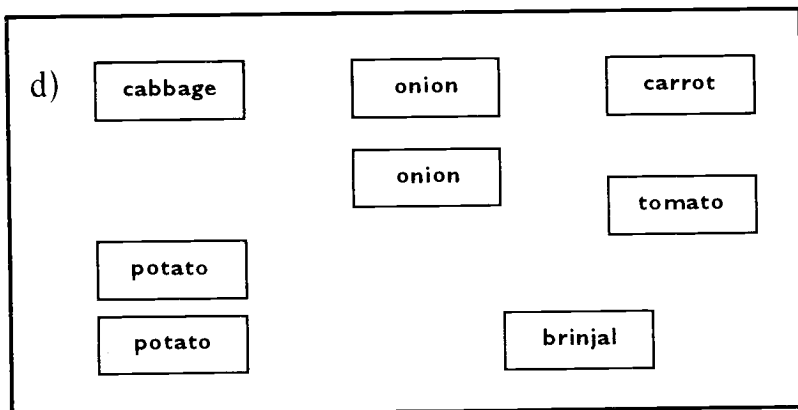
brinjal

onion

onion



Remember to say the word at every step of teaching pairing skill to students.



- Now the students have learnt to pair the words.
- The next step is to ask students to point to the words on the flash cards/worksheets. You can develop a variety of exercises for pairing and identifying activities (see functional literacy series - vegetables, fruits, animals, (1997) NIMH publication).

In some cases (for students with limited ability to speak) teaching of words at identifying or pointing level may be the maximum achievement, as naming verbally will be difficult.

- Once the students learn to identify words, ask them to read the words. Follow the same procedure explained above to teach other words.

After introducing a number of familiar nouns in this manner, action words (verbs) and adjectives can also be introduced with pictures or actions. This will help in sentence construction. It is suggested that the students be taught reading and writing of words simultaneously so that students learn decoding of words. The procedure is discussed in detail under the topic '*writing words*'.

Another approach used in teaching reading words is *paired association*. In this method, like in whole word approach, the picture is gradually faded out and the students learn to transfer the meaning from the picture to the written word. Finally they learn to read the words and form sentences.

Errorless Discrimination

This is an approach (Walsh and Lamberts, 1979) where the teacher presents the word in isolation and reads aloud pointing to the word. Four to six trials follow, presenting three to four words alongwith the target word. For example *banana*. Initially the words presented should differ significantly.

grapes

banana

circus

umbrella

As the students learn to discriminate, present words that look similar with minimum difference.

banner

bangle

banana

basket

In the initial stages of learning, minimum of two cards may be used for discrimination and the cards can be increased gradually as described under whole word approach.

Error analysis in generalization

Once a student learns a new skill, he needs to remember and recall when necessary and he should be able to generalize the skill to the situations when required. If generalization and maintenance of a learnt skill has to be ensured, the learnt behaviour must occur appropriately outside the training conditions and should be retained to be repeated when needed over a period of time. The sustained ability for generalization does not just lie in analysis of success, but also the errors. When a student performs a certain task after structured training consistently, he is exposed to a non-trained condition, which has certain similarities to the trained condition. When the learnt response is performed in a non-trained condition, error may occur. Here, the teacher should be sensitive to the factors that contribute to the error, and the ways to prevent the error. To do this, the teacher has to observe the student in several conditions of generalization training and observe for consistency in the error. This will help in finding methods to prevent the established error pattern.

To explain with an example, consider a child who has been 'trained' to eat independently using fingers without spilling (no error). He may spill (error) if introduced with a spoon (non-trained condition) to eat. Self feeding being the activity under consideration for training, the variations within that require to be considered for generalization of the total activity for independent and sustained performance. Factors contributing to the error can be the use of the spoon, holding of the spoon, the posture of the child or any other observations by the teacher. For the error correction, the contributing factor will be decided based on the consistency of error observed, correcting which, the activity gets generalized.

As Horner, Albin and Ralph (1987) put it, for generalization to be functional, it must occur with a precision that results in acquired responses occurring under, ***appropriate, non-trained*** conditions and not occurring under ***inappropriate non-trained*** conditions. This demands teaching of not only what ***is*** correct but also what ***is not*** correct. For Example when we teach identification of numeral 3, it is also essential to show what is not 3 such as 5, 7, 13, 30, 53 and so on. The student then understands that when the symbol '3' appears all by itself, then only it is called 3. On a clock dial when you ask the child to identify 1, he is right when he shows 1 after 12 but not at 10, 11, and 12 as the latter have accompanying numbers with them. This approach would limit or prevent errors from occurring right in the beginning during acquisition stage itself thus making generalization easier. As pointed out correctly by Engelmann and Carnine (1982) ***faultless*** presentation rules out the possibility of learner

making **error** in response. This will lead to precise generalization of the learnt response. In addition, this helps to a great extent in teaching academics especially differentiating similar looking words and similar sounding words. To find the meaning of “**see**” from the words **cook, look, book, took**, a child who is trained in what **is** and what is **not** with suitable examples will find it easy to pick the right word.

Above all, for successful generalization the communication by the teacher should be **faultless** and **clear**. The **ambiguity** in the teachers teaching will lead to poor learning in the student (Engelmann and Carnine, 1982). Therefore, teacher should:

- *provide sufficient examples*
- *be sensitive to learner readiness before communicating,*
- *demonstrate a range of variations within a given concept.*
- *reward the student for his right response.*

WRITING

One of the important modes of communication is written expression. Writing demands eye hand coordination, motor coordination, sense of direction and recognition of symbols (pictures/letters/numbers/words/punctuation and so on). Some writing tasks demand horizontal writing (left to write as in writing words) and some demand vertical writing as in

arithmetic (addition, subtraction) and some demand a combination of both as in statement sums.

Basically writing involves four stages namely,

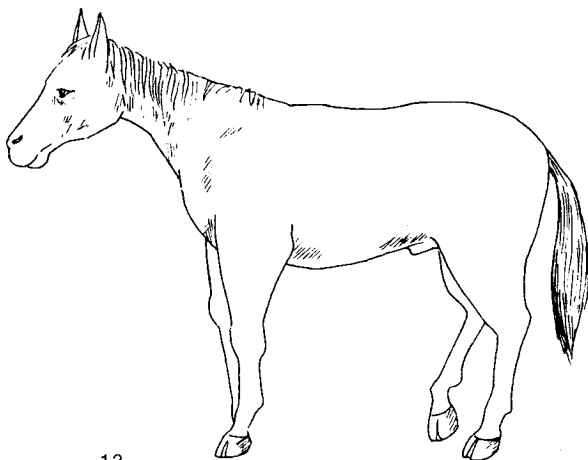
1. Tracing
2. Joining dots (if needed)
3. Copying
4. Writing from memory
(including learning spelling)

Teaching Writing

To write sight words, students have to go through six steps, using auditory, visual, tactile and kinesthetic inputs (Carbo, 1978).

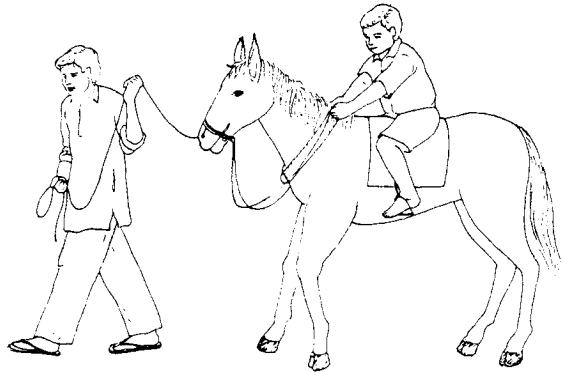
For example :

- (a) Teacher says the word and student repeats it (auditory).
Eg : horse



- (b) The meaning of the word is discussed and taught (auditory).

Horse is an animal.
Horse has four legs.
Horse riding is fun.



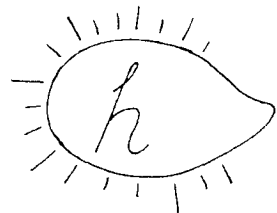
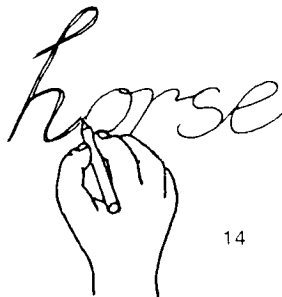
- c) The words configuration is drawn (visual).

h o r s e

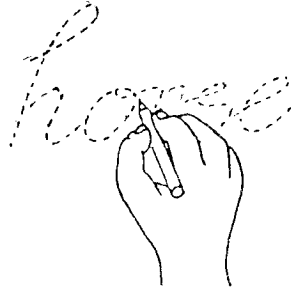
- (d) The actual word is traced (visual/kinesthetic).



- (e) The student says the sound of each letter while tracing it (visual, auditory and kinesthetic).



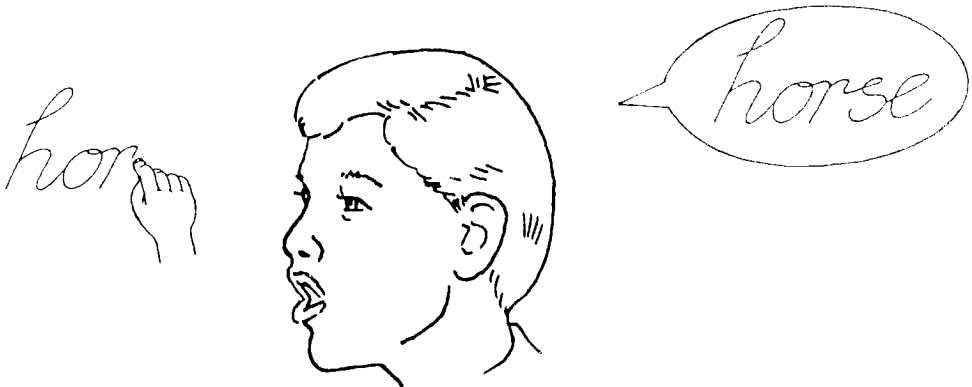
- (f) After tracing, usually the next step to follow is **copying**. If the child is incapable of doing it, **dotted line letters** can be given to join dots.



- (g) When the child consistently copies errorlessly, **writing from memory** can be the next step.



- (h) Later, the student tries to visualise the word and write it in the air (kinesthetic), saying simultaneously.



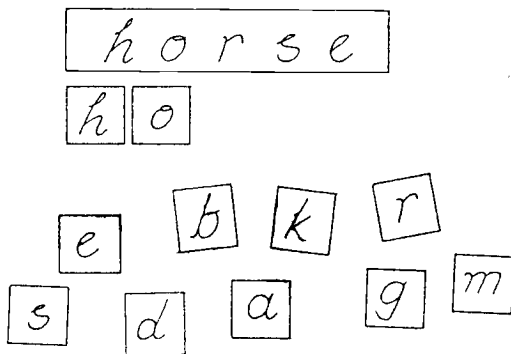
TEACHING SPELLING

To write the words from memory students should learn spelling. Following are some tips.

- Have students to say the sound of each letter while tracing and copying the words.

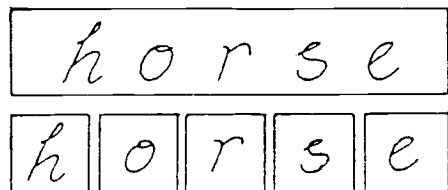
h-o-r-s-e

- Ask student to pick up individual letters in a word and match with the given model.



See that the students say the sound of the letter when they pick up and place each one under the model.

- After completing the spelling, ask the student to read the word.



- As the student learns to match the individual letters seeing the model, remove the model and ask him to arrange the spelling.

h o r

e m s
k d a
b g

- Tell the student to check the spelling by himself with the model. Allow him to identify error if any and correct it on his own. *Following this, students may be asked to write the words in their note books.*

h o r s e

h r o s e



- Give dictation along with the words learnt earlier and tell the students to correct by themselves seeing the model.
- You may also use the method of filling individual letter sounds of the words on a worksheet.

h o r s _ _

h o r _ _

h o _ _ _

h _ _ _ _

_ _ _ _ *e*

While writing, students should spell out each letter sound and at the end, should say the whole word.

In this manner, you can teach them to read a number of words, phrases, and sentences. You would notice that they have learnt to read individual letters in the process of reading and writing the words. Consider the box 'More words.....' From the few learnt words (A), using a number of new words in (C) could be developed using the learnt alphabets (B). It has further led to the construction of sentences (D).

More words.....

Learnt words (A)

mango	fan	rice
brinjal	table	doll
chilli	chair	horse
ball	shirt	
biscuit		

Learnt letters (B)

m	n	s	d
a	u	o	i
n		t	r
e	j	f	h
b	c	g	

New words (C)

dog	house	bag	eagle	one	five	tall
goat	lion	fish	boat	three	four	line
cot	jug	bus	mat	eight	mice	bun
car	gun	bin	rat	nine	egg	bat
					ten	jam
us	he	those	has			rain
me	she	these	hair			cloud
I	the	there	air			moon
am	her	here	ribbon			star
it	his	hear	ran			sun
is	to	this	fight			
has	it	that	fun			
	are					

Sentences (D)

This is a horse.	This is her bag.
That is a car.	That is his gun.
She has a dog.	He ran to the bus.

Choose a few more common words with other alphabets so that the students can learn all the alphabets in English. Sequencing of alphabets may be taught through rhymes, arranging in a sequence seeing a chart, and filling missing alphabets.

Try these.....

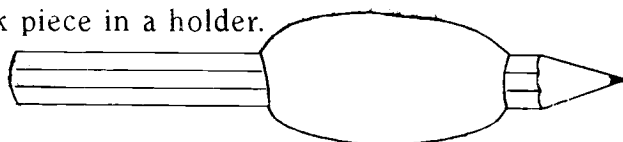
Always make it a point to use capital for the first letter of names and places and beginning of a sentence. Sensitise the student to this variation in writing.

For best results, reading and writing should be taught together. It is a good idea to have the class time-table having a combined time slot for reading and writing. This enhances multi-sensory involvement resulting in better achievement in the student. Introduce reading and writing activities right from the preprimary level.

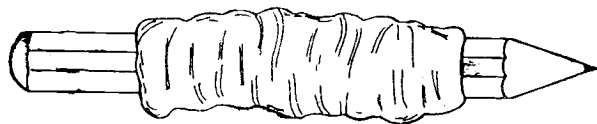
- use sand paper alphabets for tracing.
- If needed, adapt pencil to compensate for the fine motor requirement as shown below as some of the students have difficulty in holding pencil.



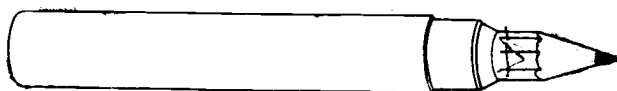
Small crayon/pencil/chalk piece in a holder.



Play dough for grip.

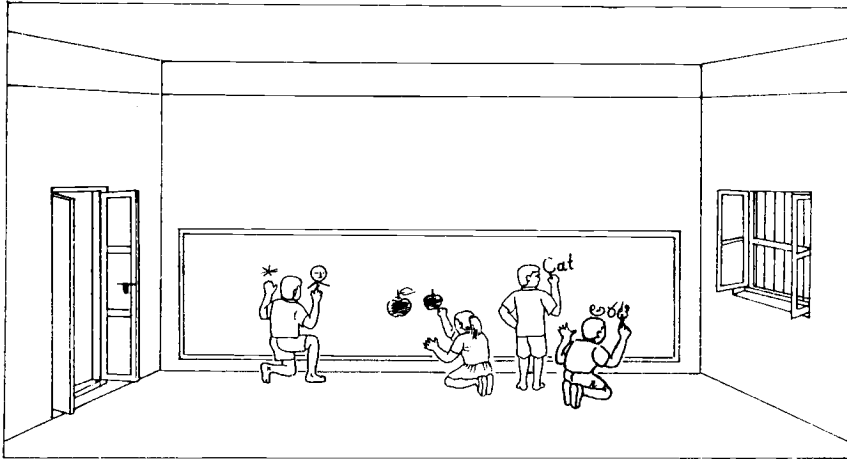


Cloth/plaster for grip.



Small pencil in a holder (used marker pen).

- Have a black board in your class at the students' level so that they can trace/copy/write on the black board.



- Develop word building games and exercises.
- Plan games which involve discrimination, identification, reading, tracing, copying and dictation activities.

For example:

- Place some sand paper letters in a bean bag.
- Allow the student to pick up one letter and ask him to feel with the finger.
- Once he completes the feeling of the letter ask him to say the sound of the letter.

- Tell him to find another sand paper letter of the same one from the bag without looking (you may blind fold the child in case the student cannot resist from looking at the letters).
- After he picks up the correct letter, tell him to trace the letter with finger and say the sound.

In the same way one can ask students to identify and copy, read and write from memory. This is just an example. You can play a number of games with students to help them learn the letters and words.

- Make combinations of consonant-vowel-consonant and allow the student to form words by changing different initial letters.

b ag f ag
 s ag w ag
 l ag t ag
 r ag

- Similarly final consonant can be changed.

ba g ba n
 ba t ba r
 ba d
 ba y

Initially start with three letter words and gradually expand to four letter words and more. Always start with familiar nouns and action words and proceed to abstract words.

- Finally the vowel can be changed.

b	a	g
b	e	g
b	i	g
b	o	g
b	u	g

- Have students read newspaper, story books and magazines and discuss in the class to see whether they have understood, as reading without comprehension is meaningless.

CASE STUDY

Four students aged 7 years and 8 years who were diagnosed as mildly mentally retarded were taught reading and writing of Telugu using whole word approach. The students could write 4-5 Telugu alphabets of vowel sounds before the intervention. Four words (nouns) of common vegetables, fruits and animals were chosen to teach in the beginning for reading and writing.

Words Chosen (Telugu words are given in appendix)

vegetables	-	onion	brinjal
		potato	green chilli
fruits	-	mango	banana
		apple	guava
animals	-	cow	dog
		cat	goat



The procedure followed is described below which is similar to the steps described under whole word approach.

Reading words

- *Firstly flash cards (picture with word) were introduced for pairing activity. While matching the picture cards, the word was read. Various activities were planned for matching. Initially only two pictures were introduced for discrimination and gradually the pictures were increased.*
- *As a next step word cards were used to match with the flash cards. Following this only word cards were used.*
- *Once the students learnt to match word cards, they were asked to point/to the words, when asked.*
- *Finally, the students were asked to read the words.*

Writing words

- *Reading and writing of words were taught simultaneously as described under the topic writing.*
- *Matching activity was followed by tracing of words. Students traced the words written on sand spread on the floor and on slate. They were made to spell out the sound of each letter after completion of tracing each letter. They traced the words for 5-6 times. Later, they were asked to copy the words on slate and in the*



notebook. While copying, they were asked to say the sound of each letter.

- After they learnt to copy, dictation was given. The students were asked to check their spellings with the model, and/or exchanged their notes with peers and corrected the spellings. The mistakes made by students were discussed.

Within three weeks, they learnt 12 words. From the twelve words, they made a number of other words, phrases and sentences.

New words (high imagery) were chosen to include unlearnt alphabets for reading. Practice on reading sounds of the letters was given by making them identify the letters and words in story books, magazines and newspapers. The passages were so selected to include the words the students were familiar with. So that they could identify and read them. Small stories were made using the learnt words for reading and writing.

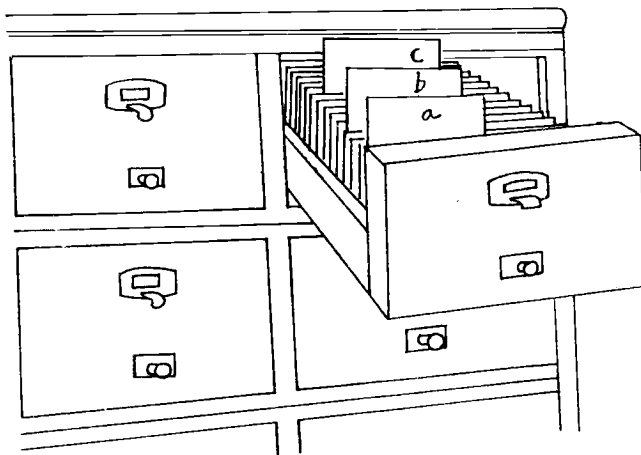
By this, it is observed that the students could learn to read, write and generalize words of utility through whole word approach. The students enjoyed the individual and group work because they understood **what** they were reading and writing. The key point is the **relevance** of the content taught through the whole word approach and the retention of the learnt words because of their daily use.

Fernald VAKT Approach (Fernald, 1943)

The Fernald method is a multisensory remedial approach combining language experience with vision (visual), hearing (auditory), movement and touch (kinesthetic and tactile) (VAKT) instructional techniques. Briefly the programme consists of the following steps.

- (a) Let the student choose a word.
- (b) Write it in cursive writing (large enough for the student to trace with finger) with a crayon on plain paper or on black board. Cursive writing is suggested because the student will tend to see and feel the word as a single unit rather than a group of separate letters.
- (c) Have the student trace the word with one or two fingers saying the sound of each letter while tracing and the whole word after completing tracing of all the letters in the word.
- (d) Let the student write the word from memory after tracing several times. If he makes errors, go back to the earlier step.
- (e) Write words in context to give the meaning.
- (f) After the student has mastered the above steps, have the words written in print/typewritten and ask the student to read.

- (g) Make individual word files of students and tell them to arrange in alphabetical order.



- (h) Encourage students to write stories using words from individual word files.
- (i) Introduce written story in typed form immediately and make students read the printed (typed) version.
- (j) File every new word in word card file which has been used in the story. It helps students to learn alphabets meaningfully without emphasis on rote memory.

TEACHING INDIAN LANGUAGES

To read in English students have to learn the alphabets and their sounds which form the basic components. However, it is not enough, if a student learns to read alphabets alone, but he should know to blend the **sounds** of letters in a word. Once he is proficient in reading words, he learns to read phrases, sentences and passages.

For Example :

ball,	red,	this,	is,	a,
apple,	big.	eat,	an,	I,

a ball	This is a ball.	I play with the ball.
red ball	This is a red ball.	The red ball is big.
red apple	This is a red apple.	I eat apple.
an apple	This is an apple.	Apple is red.

The combination of the vowels and the consonants contribute to certain sounds in English. Phonetic rules are followed to determine pronunciation of a word. To read Indian languages, the rules are different. The vowel sound is blended in consonants through matras. A student needs to learn individual letters and matras. The matras decide the required vowel sound. Though there are symbols for vowels, they are used in specific places only, and matras generally provide the vowel sounds. This is common for most of the Indian languages and is very different from English. The teacher has to keep this in mind while teaching. For this purpose, high imagery and functional words in Hindi and Telugu are listed in appendix. The words listed in appendix I and II include 70% of individual alphabets and matras which appear frequently in the print. The list includes nouns, pronouns, verbs and prepositions. Select the words based on the ability of the student and the utility (functional) of the words in his environment, as mentally retarded students take a long time to learn, to maintain and to generalise the learnt concepts.

While teaching, you may use cards of different colour or colour print to differentiate between nouns and verbs. Use different files/boxes for piling the words which the students have learnt to read. You may help students make phrases, sentences and also build up stories with those cards.

Teach reading and writing of words simultaneously as explained earlier, for Indian languages also.

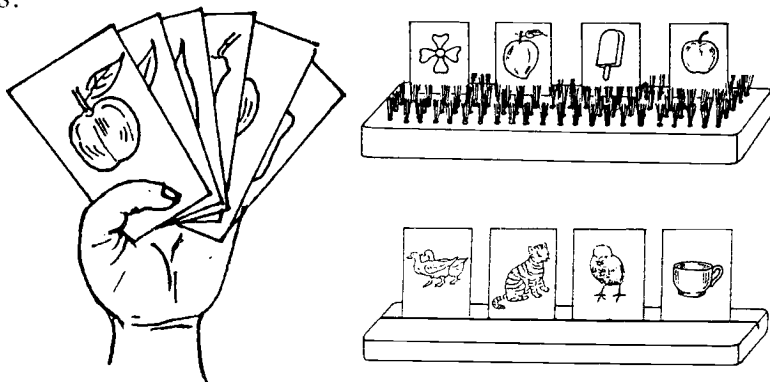
We have provided a sample list of words in Hindi, Telugu and English only. (see appendix) Teachers may construct list of words in the same manner in other languages for teaching.

SUGGESTED ACTIVITIES

Collect or prepare flash cards of various nouns/action words in the preferred language. They can be pictures or words depending on the ability levels of children. It is perhaps good to cover the cards with polythene/plastic lamination to give it a longer life and allow for wiping it clean as some of the students with mental retardation tend to drool,

- Distribute flash cards, one each to students. Make sure each one has different flash cards.
- ☆ Place one card on the flannel board and read.
- ☆ Tell students, whoever has a similar one, to place on the flannel board.

- ☆ Show the flash card and ask them to give you the similar one if they have.
- ☆ Show the flash card which none of the students have. Ask them whether anyone has a similar one.
- Divide the students into two groups (1&2) having two to three students in each group.
- ☆ Distribute two sets of cards, one each to the groups. A student in group 1 places flash card on the table. The students in group 2 look at the flash card, and locate the similar one with them, and earn a point.
- ☆ This activity can be played by two students also. Add a few single extra cards to each set i.e., there is no card of the same type for pairing.
- ☆ Students can either hold them in their hands like playing cards or you may provide a small wooden bar with groove to place them or a brush that is used for scrubbing clothes. This is useful especially for children with fine motor problems.



If you have more sets of materials you can involve more number of students.

- Reverse all the flash cards and place them on the table. Ask each student to turn one card over and find the similar one by turning the other cards. Make sure each flash card has a pair. Give points depending on number of chances the student takes to find the pair.
- Play a memory game. Start with only two pictures first.
- ☆ Show each picture card and read the name and place it on reverse side. Show one picture card and ask the student to find the similar one. The student is expected to remember the position and turn it out. If he finds the correct card he gets a point. Later increase the number of cards.
- Have two boxes (X&Y). Place flash cards in each box.
- ☆ Take out one flash card from box X. Read the name and hold it.
- ☆ Pick up one card from box Y and ask students whether both pictures are same. (Eg. This is banana. Is this banana?). Keep doing it until the same picture is picked.
- ☆ Same activity can be carried out by a student asking his fellow classmates for reaction.

- ☆ You can play this game using concrete objects/words in place of picture cards, depending on the age and ability of the students.
- Make groups of children with 2-3 in each group.
- ☆ Give a basket/box with number of picture cards to each group and one card to each student.
- ☆ Tell them to pick up all the picture cards of the kind they have with them.
- ☆ After sorting out the cards, tell each student to read the name of the picture cards sorted out by him. Also make them count the number of cards collected by each one and the group as a whole.
- Play card games.
- ☆ Shuffle the cards. (Pair of 20 picture cards)
- ☆ Distribute (5/7/9/11 or more depending on number of players) the cards to each player and keep the rest in the middle.
- ☆ Tell players to set their cards.
- ☆ Each one picks up a card from the pile of cards kept in the centre. If it matches with any of the cards he keeps it, otherwise he returns it to the pile. The next player does the same. whoever pairs first gets points. If three

players are playing and one completes pairing of pictures, the other two will continue playing.

- ☆ Use word cards if they are learning to pair the words.
- ☆ Various types of worksheets can also be prepared for matching activity.
- Place flash cards (picture cards/word cards depending on what you are teaching) in the corners of the room or spread at one place. Tell students to collect the picture cards/word cards by telling the name. (Eg. collect all brinjal cards/words). After each one collects the pictures/word cards tell them to count how many each one of them has collected.
- Play a Bingo game either with pictures or words. Have the word cards/picture cards in a box. Prepare cards of post card size and write words or draw pictures. As in Bingo, call out the words in the master card and credit the students for getting the rows and/or the full house.

ball	bag	cat	doll
apple	goat	cow	grapes
onion	fish	chair	fan
pen	dog	tap	tomato

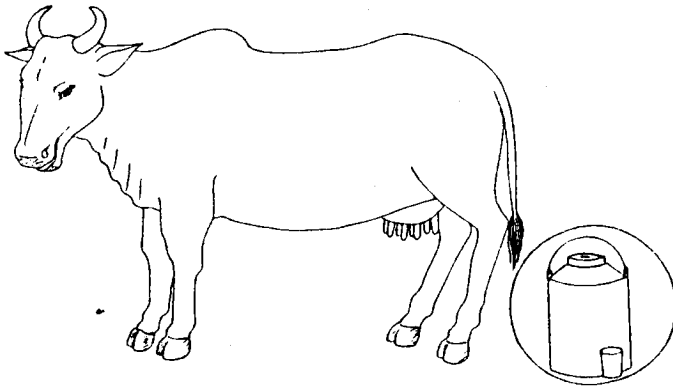
ball	bag	cat	doll
fish	car	goat	tap
chair	dog	carrot	eyes
hand	pen	pencil	potato

- ☆ Give a card to each student.
- ☆ Mix the cards in the box by shaking them.
- ☆ Take out one card and read the word.
- ☆ Tell students if the word is present on their card they cancel it (If students are not at the identification level, you may show the card so that they can find the similar word on their card).
- ☆ You can fix the points for correctly cancelling the first, middle and last row and the total house.
- Place word cards in a small bag/box. Pick up a card, show to the students and ask them to read. If they make a mistake, show a model (picture card) to serve as a cue. Write the names of the students on the board. Enter the number of words each student has read. Discuss who read maximum number of words.

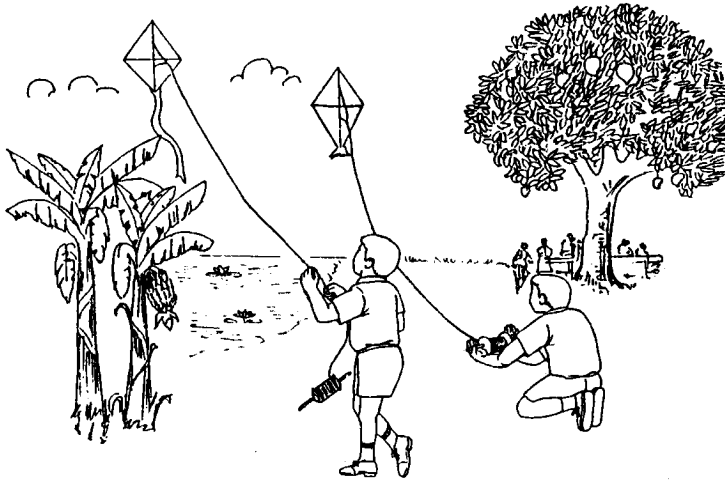
Leela	Krishna	Sanjay	Rajan
1. onion	1. ball	1. truck	1. cow
2. car	2. glass	2. mango	2. onion
3. balloon	3. onion	3. balloon	3. mango
4. mango		4. potato	
		5. cow	

- ☆ Tell students to copy the words or give dictation of words which they read.
- ☆ Build up small stories or describe an event using the word bank (pile up all the words the students have learnt to read).

For example:



This is a cow.
 Cow has four legs.
 Cow eats grass.
 Cow gives us milk.
 We drink milk.



This is a garden.

There is one mango tree and two banana trees.

Children are playing with kites.

You may introduce a few more new words which are not in the word bank if necessary.

- ☆ For students with higher reading ability, they may be asked to describe and write on their own their visit to different places. Eg. shopping, visit to park/zoo/beach/social functions, competitions.....

FOR THOSE WHO CANNOT READ AND WRITE...

The teaching of functional literacy and numeracy skills are suitable for those who are capable of learning to read and write to some extent. After giving a fair chance to the student to learn functional academics, if he does not seem to learn, alternatives need to be found. When we say functional academics, it refers to the literacy and numeracy areas that are **used** in our day-to-day living. As seen earlier, many retarded students with higher functioning levels are capable of learning and utilizing these skills. However, those with lower functioning levels, who cannot learn abstract concepts and symbols may never learn these skills. Therefore, the teachers are to find alternatives for these students to effectively function in the communities. The following steps can help:

- Identify the requirement of a student to use written script for reading, writing and numbers. For instance, bus number, directions, notice board in the work place and so on.
- Note down the frequency of the need. To know this information, classify the needs such as number of times in a day, once a day, or weekly or monthly or occasionally.

For example:

Daily needs

bathing
brushing
dressing

Weekly

wash bed linens
visit the place of worship
iron clothes

Occasional

go for movies
visit relatives
celebrate festivals

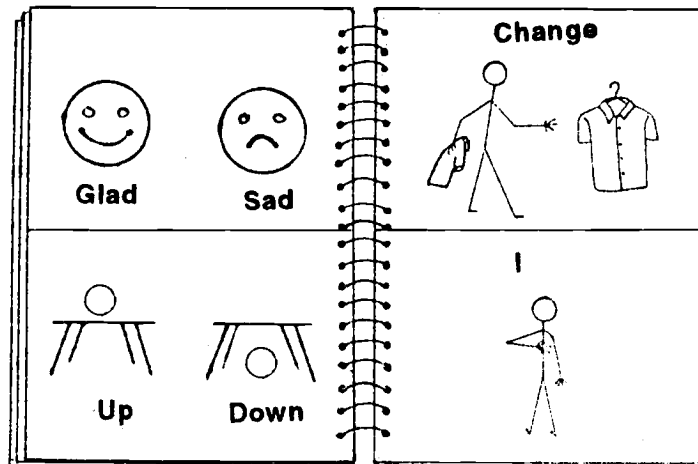
Monthly

buy provisions
pay electricity bill
clear cobwebs

- List them in the order of most frequent to least frequent.
- Identify the activities that involve reading and writing and math skills.
- Explain to the student the requirement of the written materials ***in context***. Give abbreviations or cards of written materials to keep in the pocket and train him to show to people and ask. For instance, showing the card (bus number and place) to a person in the bus stop who is waiting there and asking him whether that bus is gone.
- For needs that are infrequent, but highly important such as missing a bus and break down of a bus, prepare the student with ***one*** good option or alternative. Giving him too many alternatives will again confuse him. Firstly, the student needs to be taught to perceive that he has missed the bus or the bus will not go further due to breakdown.

Secondly, the options such as, go to the nearest shop, take help using cards as explained above are to be taught. As such occasions are less frequently occurring, asking him once in a while as to "what will you do if you miss the bus/bus breaks down" and eliciting response will help in retention of the learnt competency.

- Sensitise the students to find alternatives for written materials such as commonly used signs found for drinking water, toilets, arrow marks of directions and so on.
- Where signs are not found, generate ideas and develop signs that your student follows and have it written in script at the bottom so the helper understands what he needs. Communication boards which are commonly used for children with speech deficits will be useful here for mentally retarded students, specially for children who are non-verbal. Small pocket size photo albums with the student-specific functional signs included in it will go along way in helping him compensate for his inability to speak.



- Efforts towards explaining purposes of railway/bus time-tables, newspaper, magazines and notices will help a student understand their content and utility. This inturn may motivate him (or the trainer should take efforts to motivate him) to acquire the social competence to approach people with the literature and ask for specific information from it. Thus, though the retarded person is illiterate, he would have taken the benefit of the literature. Here, the teachers play a very important role in identifying and grouping the relevant literature and giving the student the input to appropriately use them.

COMPUTER ASSISTED INSTRUCTION

Computer assisted instruction (CAI) for mentally retarded children is another development in recent years. Multicentred feasibility studies conducted by NIMH have shown that it is possible to use computers to give literacy and numeracy skills to students with mental retardation. The studies also showed that attention and concentration increased in retarded children.

The programme has considerable amount of pictorial representations such as icons. Further, the package has the features of inbuilt feedback mechanism, repetition of instructions, consistency in the stimulus-response pattern, and individualized instruction that enhances learning in students. However, it is cautioned that it cannot substitute the teacher. The teacher has to take efforts towards generalizing the learnt skills.

To conclude, learning literacy and numeracy skills are not the ultimate end in life. They are but means to achieve certain end results. If a retarded person cannot read and write, it does not mean that he is incapable of achieving anything. Taking an example of many of the illiterates who have been successful in life, the teacher should aim at providing the student with the necessary social competencies to take someone's assistance, to get access to the written material and to use alternative methods to survive independently without having to read the written materials. However, it is cautioned here, that a teacher should declare a student to be not capable of learning reading and writing ***only after giving him a chance.*** Selection of the correct content, best of teaching and sufficient time to try and learn are essential before making a decision. It should not be a hurried decision which may adversely affect the student.

Chapter - II

Functional Mathematics

Numbers play a very important role in our life. For example, for a simple task of buying *one dozen* bananas from a vendor, we see how *big* the bananas are, we *count* the bananas immediately before we pay the *money*, *calculate* how much to *pay* and how much *change* to get back (if there is a balance). Similarly our communication with others always includes, 'how much', 'how long', 'how far', 'when'all are mathematics. We use mathematical skills at home, on the job, and in the community. Schwartz and Budd (1983) defined functional mathematics as "use of mathematics needed for vocational, consumer, social, recreational and home making activities" (p.322). However, teaching mathematics to mentally retarded students includes learning through concrete experiences and the application of learned skills. In addition, both the classroom activities and the community exercises should be blended in such a way that the generalization of skills occurs smoothly. Further, the maths curriculum which we offer to students should consider their needs when they grow to be adults and should include those skills that have high probability of use in community settings (Polloway, Patton, Epstein and Smith, 1989 and Bot, 1988).

Teaching functional mathematics

Functional mathematics includes pre **computational skills** (quantity, numbers, counting....), **computational skills** (addition, subtraction, multiplication and division), **application skills** (money, time, capacity, weight and mass, and length and distance) and **problem solving skills** (reading, understanding and application of appropriate computation in solving word problems).

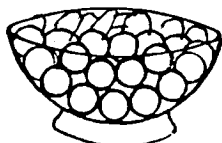
Pre Computational Skills

The development of maths skills follows a sequence. Unless the students show certain readiness or precomputation skills, they are not ready for learning computation skills. The precomputational skills include the following:

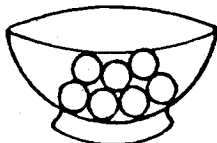
Relative position of one in quantities

It is important that the student is aware of quantity in terms of more/less/few/none before number one is introduced.

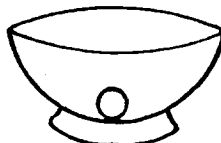
- Have four plates/bowls. Fill one of them with any of the things (eg. beads, bottle tops, shells, seeds, sweets) upto the brim (a lot/more). Second with a little (a few/less). Third with one. Last with nothing in it.



1



2



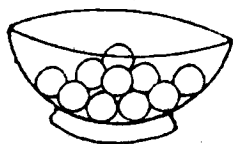
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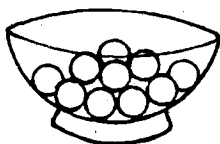
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Let the child visually find the differences in quantities. Use the terms 'a lot/more', 'a few/less', 'one', and 'none' respectively, while showing, with appropriate gestures/actions..

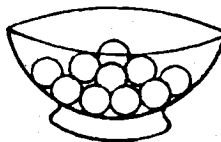
- Take four plates/bowls with few objects.



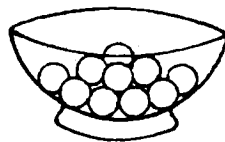
1



2

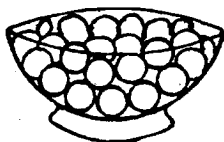


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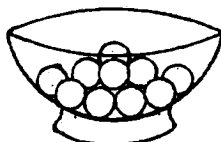


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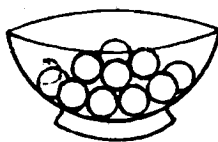
- ☆ add more objects to the first bowl to show that it has **more (a lot)** objects.



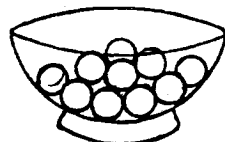
1



2

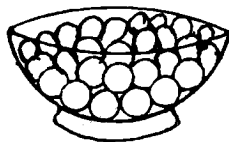


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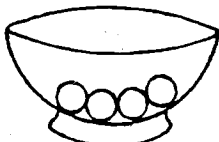


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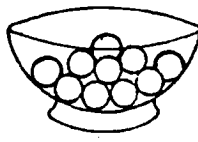
- ☆ Remove some from second bowl so that only a few are left in it. Show and say to the children that it has **a few/less**.



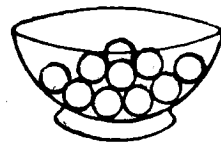
1



2

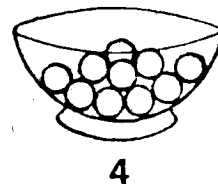
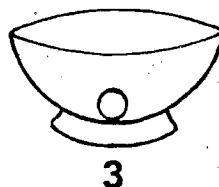
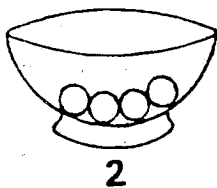
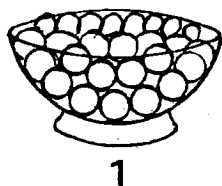


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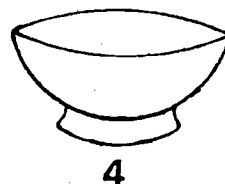
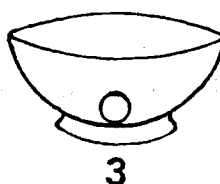
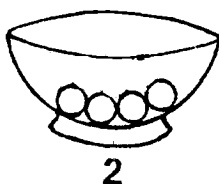
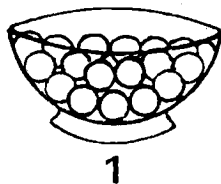


4

- ☆ Remove all the objects except one in bowl three to indicate it is **one**.



- ☆ Remove all the objects from bowl four to show it has **none**.



Allow the children to do the same to experience by themselves the relative position of 'one' in quantities.

Following this exercise highlight '**one**' showing on himself - one nose, one mouth, one head..... and things in his environment - one light, one chair, one board, one window..... Thus the student hears, sees and understands what is 'one'.

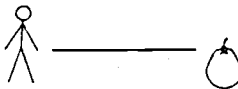
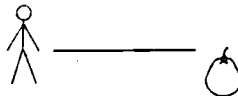
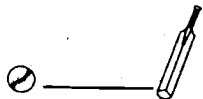
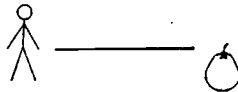
Some tips for teaching

- ☆ Tell a student to distribute '**one**' crayon/ '**one**' piece of paper to each **one** in the class.

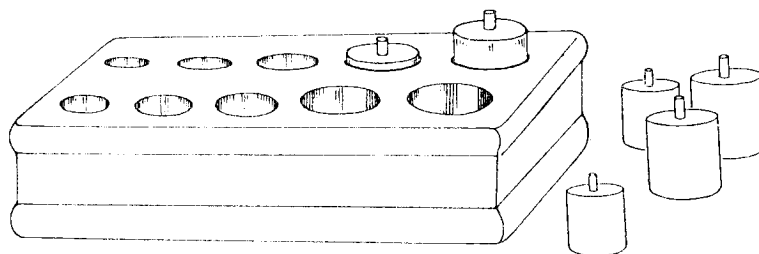
- ☆ Ask students to place **one** seed (eg. tamarind seeds) or bead in each container.



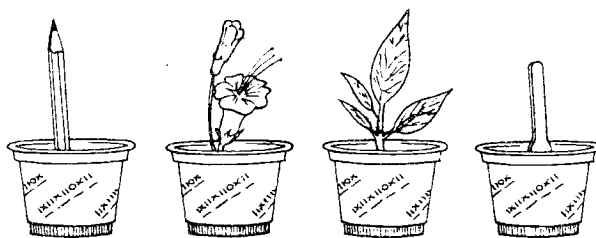
- ☆ During lunch time, tell a student to give **one** glass/ plate/ spoon to each student.
- ☆ Use worksheets in which a student draws a line to correspond, one object to one other object.



- ☆ Using a peg board, make students fix **one** peg in each hole. While placing, say the number and have the student repeat if he is able to speak.

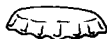


- ☆ Fill small cups (eg. used ice-cream cups, coconut shells, plastic oil/shampoo bottles) with sand. Tell the student to place **one** thing (stick/leaf/crayon/flower) in each cup saying the number. Let him understand, that what ever is the object the unit 'one' in a single piece of the object.

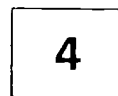


- After the student has learnt to count one, introduce the written symbol 1.

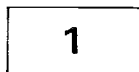
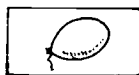
- ☆ Place number card '1' on the table. Tell the student to take one object and place under the flash card, so that he understands number symbol '1' means one item.



- ☆ Give two to three objects (pebbles / shells / caryons) to each student in your class. Show the number symbol '1' to them and ask each one to give you one object.
- ☆ Keep one object on the table. Place flash cards of numerals next to it. Tell the student to pick up symbol '1' and place under the object.



- ☆ Introduce pictures after the student has learnt to do with concrete objects.



- ☆ Once the student learns to show/identify number symbol '1', ask the student to - read the numeral by showing a flash card.
- ☆ As a generalisation activity, show number symbol '1' in calendar, clock, currency, bus number, telephone dial and door numbers.
- ☆ As explained in the chapter of reading and writing, teach writing of numeral along with reading of numeral. Follow steps explained under writing numerals.

When the concept of one has been taught successfully, place **'one more'** with the known **'one'**. Let the students see that **one** gets added to **'one'** to make another quantity called **'two'**. As children visually experience the 'increase' in '2' when compared to '1' the chances of understanding and comprehending is better. It also helps students to understand that the value of '2' is more than the value of '1'.

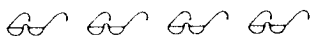
As you did earlier, show **'two'** on you, - like 2 eyes, 2 ears, 2 hands and 2 legs and so on and '2' around you like 2 doors, 2 windows.... Make games out of it. By this, you move from **'known 1 to unknown 2'**. Then teach reading and writing of numeral '2' as explained in teaching the numeral '1'. Similarly continue teaching 3,4 upto 10.

- As we have already introduced '**nothing**' or '**zero**' in relative quantity even before introduction of '**one**', it is easier to introduce the number symbol of '**0**'. Introduce the concept '**zero**' to make them understand its value as "**nothing**" (0) when independently used and its importance when placed on the right of a numeral (10).

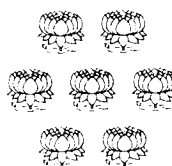
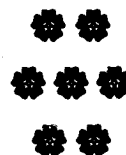
Here are some tips.....

- Make students clap/jump/throw the ball and count.
Eg.
Tell students 'let us clap/jump three/four/six times'.
Count while doing the activity.
- Let students count the number of his/her classmates before distributing things in the classroom/dining room.
Eg.
How many books/crayons/pencils/pictures/scissors/plates/ spoons we need?
- Use worksheets for counting.

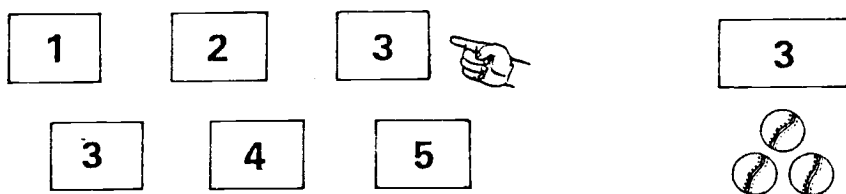
Horizontal counting



Cluster counting



- Have students classify things/picture cards and count them (Eg. rubber, pencils, vegetables, fruits).
- Give students a chance to count one rupee notes/coins.
- To begin with, use concrete objects, plastic/wooden symbols. following which number flash cards may be used.
- During activities for matching exercises, matching remember to say the numeral (one, two) while doing.
- Tell the student, "Show me one" or "Give me two". to check for counting.
- Ask the students to show you the numeral and place the matching number of objects. This helps in counting object to the corresponding number.



- Lastly ask students to read the numeral.
- As in reading and writing, while teaching numbers identification of numeral and writing the numeral should be done as a unit, rather than introducing writing later. Remember that learning is better when there is multisensory input.

- Prepare worksheets for teaching (eg : workbook 'numbers' - NIMH Publication).
- Let the students match, identify and name numerals written in various places (bus number, bus stop number, clock, newspaper, book pages, currency notes, calendar, 1 kg., 2 kg., packets in super market) for generalization of the concept.
- While playing games, use points for counting and writing the numerals or placing flash cards.

☆ How many times did each one catch the ball?

Name	Points	Total
Sujatha	IIII	= 4
Krishna	IIIII	= 5
Pavan	IIII	= 4
Kishore	IIIIIIII	= 8

☆ How many times did each group throw the ball into the bucket?

Group A	Group B
IIIII = 5	IIIIII = 7

☆ How many pins (tins plastic bottles) fell when each one hit at them?

- ☆ How many seeds/paper balls did each one blow out of the circle.
- ☆ The list is endless. Add as many games as possible.

● **Writing numerals**

As mentioned earlier, teaching writing involves three steps

- (1) Tracing,
- (2) Copying and
- (3) Writing from memory.

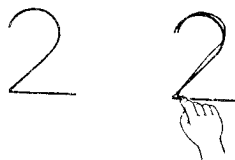
Reading and writing activities should go together as it reinforces learning of a particular concept.

Tracing

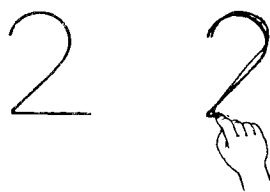
- ☆ Use sand paper, felt paper, rough jute cloth or rough plastic cutouts pasted on flash cards for tracing. You can make your own sand paper. Apply a thin layer of gum on a thick chart paper. Sprinkle sand and let it dry. You can also make colour sand by mixing rangoli powder or food colouring to the sand as it can serve as cue for some children.
- ☆ Analyse the parts of the numerals before starting tracing activity. You may say-first we do this, next this,....



- ☆ It is helpful to write a complete figure on the board and write another model while student observes.



- ☆ Make students trace with fingers (as in montessori method) over the number symbol and say the sound of the symbol after writing. In this process, the student '**sees**' (visual) the shape of the symbol, '**hears**' (auditory) how it sounds, '**feels**' (tactile) the shape when it is written and movement (kinesthetic) of the hand to get the right shape of the symbol.



- ☆ Following this, the students may be given a task to trace the symbols written on a slate or note book. If required, opportunities to join dotted lines can be provided.

Copying

- ☆ Write symbols legibly while student is observing you. Make sure that the student **'says'** the sound of the symbol after copying each one. Some students may not verbalize. In such cases, you say the sound of the symbol, so that he relates the sound to the symbol. This would facilitate when you ask him to identify (show me/give me/pick up) the numerals.

Writing from Memory

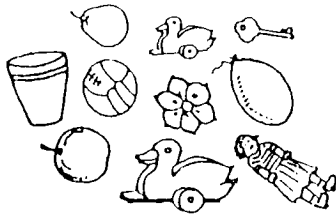
- ☆ Last step is writing from memory, i.e., the student has to recall the shape of the number symbol from his/her memory when told to write.
- ☆ Give dictation of numerals. If the student writes a wrong symbol, show the correct symbol model for a few seconds and tell the student to write.
- ☆ Let the student write numerals from 1-10 in a sequence. Ask the student to check whether he has written correctly by comparing a model. While writing numbers in a sequence, always insist that 10 is written with '0' (at unit's place) below 9 and 1 is written to its left. (at tens place) By this, the error in place value can be avoided when he learns the two digit and multidigit numbers.
- ☆ Give worksheets with missing number to fill in.

Teaching Numerals from 11-20

It is essential that the students understand that 10 and 1 is 11 and **not** 1 and 1

Follow the steps given below :

- Tell students to group the objects (eg. pebbles. shells. bottle tops, match sticks. seeds) into 10 and 1 separately and place number symbol.

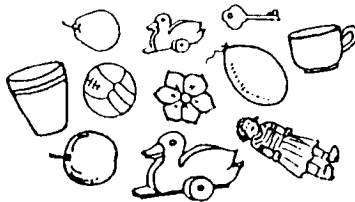


10



1

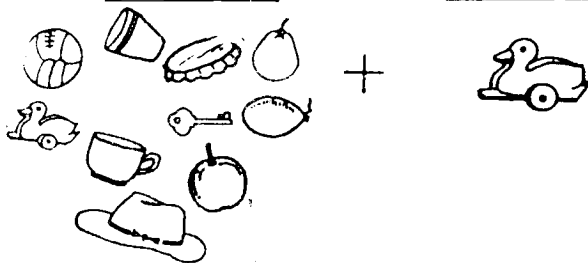
- ☆ Let them add 10 objects to 1 object. Ask them to count the number of objects and tell them to pick up number 11 flash card and place below the eleven objects. This process helps students to understand concretely that 10 and 1 is 11.



11

- ☆ Place number cards 10 and 1 and tell student to place the corresponding number of objects. Ask him/her to **add** and place the number card.

$$\boxed{10} + \boxed{1} = \boxed{}$$



- ☆ Use worksheets where in students write the numbers for the given quantity or draw quantities for the given numbers..

- ☆ You can also ask the student to expand the number.

$$\boxed{11} = \boxed{10} + \boxed{1}$$

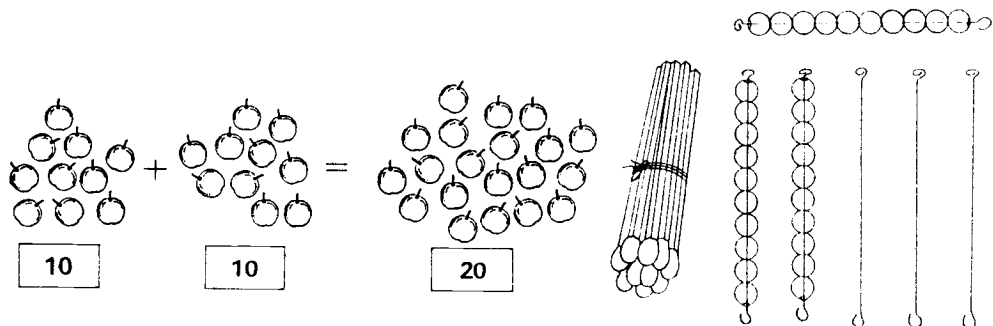
- Allow the student to use currency in whole numbers not involving changes to do similar additions. Generalization activities such as Rs.10 and Re.1 is 11 rupees may be introduced at this point.



- ☆ Introduce further numbers as the student progresses in learning and see that the activities and opportunities are planned in such a way that the students are able to transfer the learned concepts in the classroom to the situational demands in their daily life.

Counting in 10s

While teaching to count in tens, follow the same procedure explained under teaching numerals from 11-20. Only change is that you ask the student to group objects in 10s. Later bundles of match sticks or a string of 10 beads may be used to count one bundle as ten.



- ☆ The student can be taught to count the Rs.10.00 notes, to tell the amount and to give change to Rs.20.00, Rs.50.00 and Rs.100.00 in multiples of ten. In addition, he can also be taught to use multiples of 10 paise for the purpose of buying.
- ☆ Give ten rupees more to a student to what he already has and ask him how many rupees he has.
- ☆ Give Rs. 50 to a student to buy something worth of Rs.10/- or Rs.20/- and ask him how much is left with him.

- ☆ Give activities in which he has to put together objects such as pens, pencils or boxes in 10s. This can later help him in packing objects in given units.
- ☆ It is a good idea to teach multiplication table of 10 like teaching rhyme/song, so that the student may quickly recall sum totals by telling table when needed.

Cardinal and Ordinal numbers

Cardinal number indicates quantity (eg. **how many** boys are there?) and ordinal number indicates position (**which** boy is standing **first?**). In other words when the '**order**' or position is denoted it is ordinal number.

Talking about cardinal numbers for instance, how many, how long, how far, how much are questions answered with cardinal numbers. Consider, 'how many books (five)', 'how far is your house (2 kms.)', 'how much did you pay for your pencil (Rs.5.00)', 'how long will you take to reach home (2 hours)', 'how many kilograms of onions did you buy (3 kgs)', 'how many litres of kerosene did you get from the shop (5 litres)'. As you see, whatever is the unit used, the number is cardinal.

While talking of ordinal numbers, highlight that it always refers to rank, position or order. For instance, in a row of pencils graded by length/colour 'what is the **position of longest** pencil' or 'what colour is the **5th** pencil', refers to order. In competitions and sports, the references are made

to **position** of winner in terms of **1st, 2nd, and 3rd**. Talking about families, ask children the **order** of the siblings such as ‘who is **first born**, himself, his brother or sister, who is ‘**second**’ and so on.

Some Tips...

- Ask students to count **how many** boys and **how many** girls are there in their class?
- Tell students to stand in a line. Ask who is standing **first/second**.
- Use terms **first/second....** while arranging/stacking things in the classroom/house.
- While discussing domestic activities such as arranging clothes and utensils in shelves give opportunities to answer questions, such as ‘what do you keep in the **first** shelf, **second** shelf and so on.....
- Use worksheets wherever appropriate.
- Use picture charts/tell stories and asks questions related to the **quantity** and **position**.
- Sensitize the student to the utility of cardinal and ordinal numbers in daily routine.

Computational skills

Addition

Addition is the basic operation upon which all other computational operations are constructed. Many specific addition related skills are used in other operations such as multiplication and division. Students, who have deficits in basic addition skills are likely to exhibit problems in all other areas of computation skills as well. Therefore, it is important that the teachers plan out instructions for the clear understanding of the concept of addition. The activities in the initial stage of teaching should be very concrete.

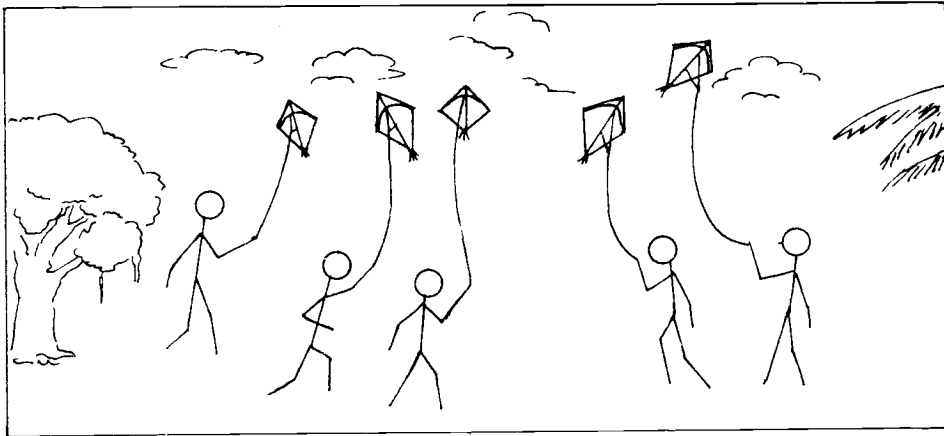
As explained under counting earlier, addition can be introduced in an informal manner as application oriented activity when numbers are being introduced. Eg. when two is being introduced, the teacher shows that one more is 'added' to the one to make it two. However, formal addition activity may follow the sequence given below.

- Start with simple word problems using concrete objects.
- Give three / four objects to students and ask them how many they have. Tell student 'A' to give two objects to student 'B'. Then ask student 'B' how many objects he has now. See that the students visualize and understand that the amount **increases** when we **add**.

- ☆ You can tell simple stories using a flannel board and pictures.

Eg :

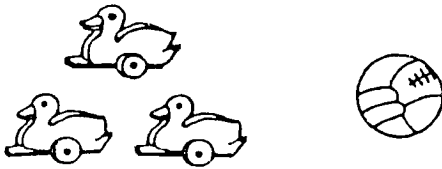
Place three boys playing with three kites (cutouts) on the flannel board. Say "Here comes two more boys to play with them. Tell how many boys are playing now".



- Next introduce number cards.
- ☆ Place number cards 3, 1 and the number of objects and read the sum.
- ☆ Push three objects towards one and count them. Then place the correct number card. 4. Give practice to the students.

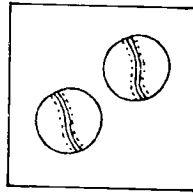
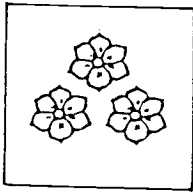
Show to students that + sign is 'putting together' two lines - one vertical(I) and one horizontal(—). Equal to sign is (=). The equal sign has two horizontal lines. Use the equivalent words to refer 'total' - such as, 'put together', 'altogether', 'sum of' and so on. Give ample opportunities to identify symbols.

$$\boxed{3} + \boxed{1} = \boxed{4}$$



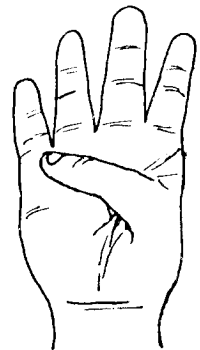
☆ Use pictures in place of concrete objects (worksheets).

$$\boxed{3} + \boxed{2} = \boxed{5}$$






☆ For counting, you may straight away introduce finger counting. As normal children learn, you may perhaps introduce the method as children say, 'four in mind, two in hand, after four...' and then they count fingers to add the 2 to 4 resulting in 6. Remind them to keep bigger number in mind and smaller one in hand while adding.

$$\boxed{4} + \boxed{1} = \boxed{5}$$



- ☆ Introduce addition of zero in similar manner with pictures and later without pictures.

$$\boxed{4} + \boxed{0} = \boxed{4}$$

 $+$

 $=$


$$\boxed{0} + \boxed{3} = \boxed{3}$$

- ☆ The next step, is vertical presentation of addition sums.

Eg :

4	5	3	2	0
+2	+1	+3	+0	+5
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

- ☆ Money computation skills should be taught simultaneously. For example "How much is two rupees and a one rupee?"

Eg :

Rs.-Ps	Rs.-Ps	Rs.-Ps
2-00	3-00	5-00
+1-00	+4-00	+3-00
_____	_____	_____
_____	_____	_____

It is better to teach application of numbers including computation even if the student knows numerals only upto 10, rather than, blindly teaching numbers by rote in 100s. However, take into consideration the capability of the student and plan the content and instruction.

- ☆ Make sure that the rupee position alone has single digit amounts and paise is zero. Tell students that the number on the right side of the dot refers to paise and that there is no paise in this sum, hence zero is written. Remember this is an exercise for generalization of single digit addition to money.
- ☆ After students learn to do single digit two line addition, teach single digit 3 to 4 line addition sums depending on the students' awareness of numbers. For example, if the student is only able to read and write numerals upto 10, the total of the sum should be within ten.

Eg :

			Rs.-Ps	Rs.-Ps
3	3	3	2-00	1-00
2	2	0	3-00	2-00
+ 1	4	4	2-00	3-00
<hr/>	+ 1	+ 2	+ 2-00	4-00
<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	<hr/>	<hr/>	<hr/>	<hr/>

- Once students learn to do single digit addition, teach double digit addition without carry over. Remember to insist on addition from units and not from tens as children have a tendency to work from left to right as in reading language. If needed, initially colour coding can be used such as all unit numbers written in green and tens number written in red. Then instruct the child to ***always*** start at

green and proceed to red and so on. As the child acquires the skill and gains mastery, fade the colour code.

Eg :

		40	Rs.-Ps	Rs.-Ps
35	63	75	10-00	25-00
+ 3	+ 20	+ 12	+ 25-00	+ 2-00
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Subtraction

Subtraction is the opposite of addition. The sequence of procedures described in teaching simple addition can be used in teaching simple subtraction. Instruction should proceed from total use of concrete objects to abstract forms as described under simple addition. While introducing the symbol 'minus' (—) use the maxim of proceeding from known to unknown ie., 'plus' (known) to 'minus' (unknown). Show to the student that from '+' when you **take away/remove** the vertical line (I) it is the symbol for subtraction (—). As taking away is the concept here, the student would easily and logically understand and accept the symbol. As in addition, introduce the related terms such as 'minus', 'take away', 'balance', 'left over', 'remove' and so on.

Sequence is briefly given below.

- Introduce single digit subtraction, followed by introducing '0' in bottom line.

Eg ;

$$5 - 3 = \quad ; \quad 6 - 4 = \quad ;$$

$$2 - 0 = \quad ; \quad 4 - 4 = \quad ;$$

8	7	9	5
-5	-4	-0	-5
_____	_____	_____	_____
_____	_____	_____	_____

- Introduce double digit sums without borrowing and also subtraction of zero in the bottom line.

Eg :

84	74	32	67	56	98
-32	-30	-12	-27	-04	-80
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

As in addition, begin subtraction at unit place in double digit sums. use colour coding initially to differentiate between units and tens if necessary. While doing single or double digit sums (in the sum or in the answer) insist that single numbers are always written under units. Give ample exercises.

- As mentally retarded children have poor retention, it is likely that they could have forgotten addition if not checked. Hence remember to give sums of addition and

subtraction in the same worksheet. This will also help in identifying and using symbols correctly.

Eg :			
25 02 +12 _____ _____	73 -21 _____ _____	63 -10 _____ _____	20 24 +15 _____ _____
45 -12 _____ _____	34 +52 _____ _____	43 30 +12 _____ _____	54 -20 _____ _____

- Give opportunities to use addition and subtraction in daily routine such as adding and paying bills and quantities of items bought/used.

Carry over in addition and borrowing in subtraction.

One of the pre-requisites for teaching of carry over and borrowing is the understanding of **units**, **tens** and **hundreds**. Therefore, while teaching single digit sums or double digit ones without carry over or borrowing, introducing terms such as units and tens and making sure that the student works from right hand side is very important.

Carry over

- Introduce 2 line 2 digit addition with carry over and show that only unit number of sum total gets written under units. Tens is carried over to the top of tens line and written. Then allow him to add up the numbers in the line of 10s and write in the given slot. Here also, colour codes can be used and faded later.
- When he has mastered 2 line 2 digit addition, introduce 3 or 4 line 2 digit, one row involving zero, combination of single and double digit and so on.

Eg :

			69	36	18
		33	71	07	05
39	97	36	10	82	20
+ 44	+ 46	+ 82	+ 24	+ 09	+ 04
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

- Give sums of daily activities so that he generalizes the computation abilities. Eg. “Ramu had 12 marbles, his father gave him 5 more and brother gave him 6 more. How many marbles does he have.” Find out the interest of the student or the daily experiences that he comes across and make up sums to suit him so that it is of utility and interest to him.

Borrowing

- As in addition, make sure that the student starts at units. Show him that unit takes a number from tens when it cannot subtract the number below. The tens gives away one ten to unit and reduces by one ten in its total. Teach like a story for better results.

$$\begin{array}{r} 42 \\ - 16 \\ \hline \hline \end{array}$$

- Make him write the reduced number in tens and cross out the existing number in ten ***immediately*** on giving away to ones.

$$\begin{array}{r} \overset{3}{4}2 \\ - 16 \\ \hline \hline \end{array}$$

- Similarly the borrowed number by units be written beside the unit.

$$\begin{array}{r} \overset{3}{4}\overset{1}{2} \\ - 16 \\ \hline \hline \end{array}$$

- Allow him to take away the number in ones in the bottom line from the reconstituted ones and write down.

$$\begin{array}{r} \overset{3}{4}\overset{1}{2} \\ - 16 \\ \hline 6 \\ \hline \end{array}$$

- Help him to regard the newly written number in tens on top line and minus from it, the tens in bottom line.

$$\begin{array}{r} \overset{3}{4}\overset{1}{2} \\ - 16 \\ \hline 26 \\ \hline \end{array}$$

- After ample opportunities to perform and having achieved mastery, introduce in the following order.

	74	65
☆ Zero in the bottom line	- 30	- 20
	_____	_____
	_____	_____

	60	50
☆ Zero in the top line	- 37	- 12
	_____	_____
	_____	_____

	432	740
☆ Three digit subtraction	- 120	- 228
	_____	_____
	_____	_____

	32	432
☆ Different digit combination	- 8	- 67
	_____	_____
	_____	_____

- As in addition, give subtraction problems that the student faces in day to day life.

Eg.

Babu had 55 mangoes. 16 were rotten, How many were good.?

- Later introduce combination of addition and subtraction.

Eg.

Mala had 25 sweets. She gave 3 to Shubha, 4 to Vani and 6 were stolen. How many sweets are left with her. ?

- If needed, enact in class first and then make the students do on paper. Gradually relate to money, weight, length and other mathematical concepts involving addition and subtraction.

Eg.

- ☆ Ram bought 5 meters of cloth. He used 3 meters of cloth for stitching shirts. How many meters of unused cloth is balance with him ?
- ☆ Krishna's garden yielded 20 kilos of brinjal, 10 kilos of tomatoes and 5 kilos of beans. How many kilos of vegetables are yielded in Krishna's garden altogether ?
- ☆ Lakshmi's father gave her Rs.10.00, her brother gave her Rs.5.00 and her sister gave her Rs.4.00. From that she spent Rs.11.00. How many rupees balance will she have?
- After considering the student's background such as rural, urban, occupation of parents/ guardian and environment in which the family lives, construct mathematical problems. This enables the student to relate himself to the situation and respond to the sum. Such an effort is

not only function oriented, but will also keep the student's motivational level high, as it involves his living environment.

Note :

Teaching multiplication and division are not explained in this book though there is a mention of learning table 5 and 10 as they are functional and useful in time and money skills. However, if a teacher is able to achieve basic addition and subtraction skills in her student with its functional applications, basic numeracy skills required for independent living will be met by the student. If the teacher finds the student capable of comprehending multiplication and division, she may go ahead to teach, *only* after ensuring that he is totally independent in *addition* and *subtraction* skills.

Chapter - III

Mathematical Applications

Several different areas involve application of the math skills in daily living. Some of the areas included are money, time, capacity, weight and mass, and length and distance. All these areas involve some type of measurement. Though the money and time are not generally thought of as measurement, they too indicate measurement. Measurement is based on relative comparisons. While defining time, we are comparing a period between two events with a predetermined duration, usually called minutes and seconds. Likewise money helps us compare the worth of objects, for example something worth Rs.30/- is more valuable than something worth Rs.10/-.

Money

Instruction about money should follow a sequence throughout student's education. Practical and real life experiences should be provided for the application of skills. Moreover, the instruction has to be planned in such a way that each student's needs in terms of utility are met.

Here are some tips....

- The money concept should be introduced simultaneously alongwith the teaching of number skills as explained earlier. By doing so, it facilitates application of learnt skills when required.
- Teaching of number and computation skills follow a sequence and the introduction of appropriate money skills does help the student to learn step by step. Provide opportunities and plan activities in such a way that the students get to generalize the learnt skills.
- Discuss and give them the experience in the use of money to develop the concept of value and the understanding that it is used in exchange for goods, services, entertainment and so on.
- Start with teaching rupee value as paise needs number concept beyond 10. Moreover, in today's existing market rate, the buying value of paise is minimum and thus with paise, children will have only limited experience of exchange of money for objects. Can you list things that you can buy for less than a rupee? Not very many, isn't it. ? Try listing things within Rs.10/- not involving changes. Yes, now it is easy. This allows for teaching actual exchange to students.
- Take your students to a nearby shop, canteen, post office and such other places to buy certain items.

- Have simulated shop in the classroom and let the student exchange the roles of customer and shop owner as part of the daily time table.
- Ask the students to prepare a budget for cooking some items in class for picnics or for outings.
- Give them opportunity to make a list of items required from the super market/ grocery/vegetable shop. Let the students buy initially under supervision and gradually on their own.
- Make the students read the price tags. (Use wrappers of soap, cartons of tea, coffee, milk powder and other items). You can also use them to teach the student to write bills and to learn application of computation skills.
- Let the students match the existing currency notes and coins (Rs.1.00, Rs.2.00, Rs.5.00, Rs.10.00, Rs.50.00) with price tags. Give combination of notes. Sensitize him/her to the 'Rs.' written in front of the number (Rs.3-00) which means the numbers following Rs. refers to money.
- Use actual bill for teaching calculations
- Introduce other coins (Rs.0.50, Rs.0.25, Rs.0.20, Rs.0.10) alongwith currency notes amounting to Rs.1.50, Rs.2.25, Rs.4.20, Rs.6.25 etc. Let students read the tags and pay the correct amount.

- Calculator may be introduced to the students who are unable to learn addition and subtraction effectively. Experience shows that systematic teaching of using calculator to students to compute money leads to independence in managing money. As you are aware, task analysis for use of calculator is quite different from manual computing. Therefore carefully analyse the task before starting to teach.
- Provide an opportunity to students to have direct experience as well as in workbooks with real pictures of money to teach money concept. The workbook should include recognition of coins, relative value of coins and deriving correct change from purchase of various items and such other exercises.
- When a mentally retarded person happens to have a bank account he should be informed regarding the chances of misuse and the family should be involved in the programme.

Currency based token economies

Token economy is a system whereby, the student receives tokens for his performance as per the target. Usually, the teacher and the student have a contract and it is decided as to what token will be given for what level of performance and consequences if he fails to achieve. The tokens can be anything such as stars, metal tokens made out of bottle caps or other such materials and plastic coins of different colours

or shapes denoting different values (Eg: red stars = 10ps., green stars = 25 ps., silver stars = 50 ps., and golden stars = 1 Re.). As the student achieves the target set, she/he receives the deserving token. If he fails, he can also lose a token if it is decided in the contract. As each token means certain amount of money, at a given time, she/he can exchange desired tokens to equivalent money to use in the way she/he wants.

Procedure for implementing currency based token economies

In token economy system, the students receive tokens for achievement of the target task that can be exchanged for privileges or activities of choice. The following are some of the basic rules for establishing a classroom token economy.

- ☆ Decide the expected achievement for each student.
- ☆ Describe to the students the expected achievement clearly so that they can understand.
- ☆ Display the rules for receiving tokens and review them frequently with students. (use figures or pictures if the students cannot read).
- ☆ Select an appropriate token. It should not be such that it is easily forged or duplicated, or one that is expensive to distribute to students.

☆ Formulate the rules under which tokens may be exchanged.

☆ Develop a reward menu and display it in the classroom where students can see easily.

☆ Implement the token economy. Start small and on a limited basis and build on a firm foundation.

☆ At first, provide immediate feedback for achievement. Give tokens as soon as the student has performed the task as specified.

Initially allow immediate token exchange and slowly move token exchange to designated time during the day, twice a week / once a week

☆ Gradually change from a continuous to an intermittent presentation of tokens.

☆ Revise the reward menu often. Do not let children become bored with the programme.

Token systems can be implemented for both individuals and groups. However, the general rules will be the same for all the group members in group contingency procedure where as the rules will be different in individual contingency procedure as the goals set are different for each student.

Reward Menu

Tokens	Reward
Re 1-00	Choice of Craft activity
Rs 0-50	Listen to music
Rs 0-75	Choice of game
Rs 2-00	Ice cream
Rs 0-50	Pencil

Reward Chart

Name	Mon	Tue	Wed	Thu	Fri	Sat	Total
Raghav	●☆☆						
Ashita	●●●☆						
Leela	☆☆						
Chandar	☆☆●●☆						
Ramakanth	☆						
● = Rs. 1-00 * = Rs. 0-75 ☆ = Rs. 0-50							

Currency based token economy is an alternative method to using work books or simulated situations in teaching money skills to students with mental retardation. Token economies are usually developed to motivate students to do their work or to control disruptive behaviour. A currency based economy can be used effectively to teach counting, change-making and the relative value of the money. It provides an environment that promotes decision making regarding the safe keeping of money, what can and cannot be purchased with money on hand, how to save money and so on. At the

vocational level, students can be paid for coming to class on time, punching in and out, getting to work quickly without delay, and doing accurate work. Finally, the very concept of ***'earning money'***, relationship of vocation to income, variation in jobs, competency in job skills and their relevance to earning are to be taught. Experiences simulated at prevocational level, if systematically done, will contribute to the achievement of the concept of earning money.

Time

The first instruction in time should be to develop an understanding of the concept of time as a unit and as a sequence of events. A pre-requisite to telling time is an understanding of time itself. Calendar, year, month, week, today, tomorrow, yesterday, next week and so on are basic concepts to understand time. Following this, the students need to learn to relate activities to time -(for example bathing, breakfast, or going to school are done in morning, dinner and sleep are related to night). The schedule of events aids in teaching time. Teaching of tasks performed daily, once a week (visit to place of worship/market) once a month (pay electricity bills), in certain seasons/occasions (activities of rainy season/activities related to festivals) can also make classes interesting in addition to teaching time.

The sequence for teaching time

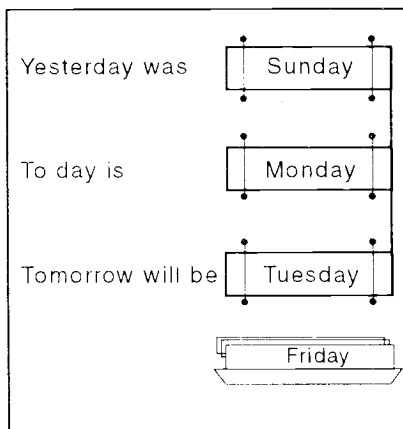
- Let the students understand the ordering and the sequencing of the day by discussing with them what they

do from the time they get out of bed in the morning until the time they go to bed at night.

- Use role play, songs and flash cards to teach the sequence of actions and the things needed to perform those activities. For example, on waking up in the morning, one brushes teeth.
- Build stories around the daily events to provide novelty.

Through these experiences, students will be able to relate the activities to the time of the day.

- Have students change the day and date in a calendar. Spend a few minutes everyday before beginning of the morning activity on discussing what day is today, what day was yesterday, and what day will be tomorrow. In the similar way teach the date. Use a chart, flash cards and/or calendar in the class and at home to teach day and date.



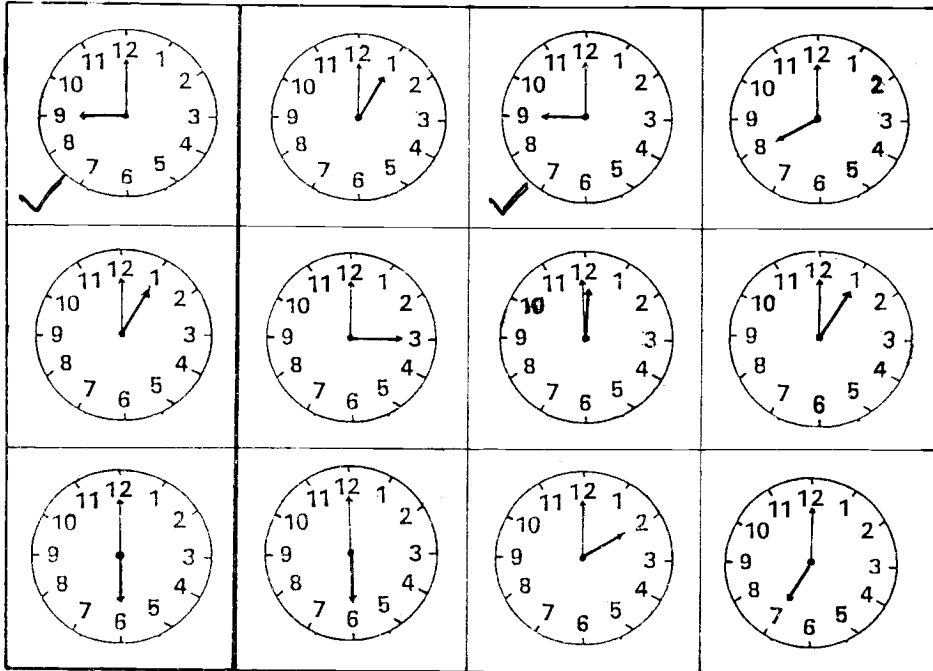
JULY 1998				
SUN	5	12	19	26
MON	6	13	20	27
TUE	7	14	21	28
WED 1	8	15	22	29
THU 2	9	16	23	30
FRI 3	10	17	24	31
SAT 4	11	18	25	

- Teach students to read and write names of the weekdays/ months in a sequence using a calendar. Have students mark national holidays/festivals, on the calendar. Discuss the number of days and weeks in a month.
- Explain each season in terms of the climate, the clothes we wear, the food we eat and the seasonal fruits, vegetables, and flowers we get during the seasons. The content should be appropriate at each class level. Teaching of seasons may coincide with the respective seasons so that students experience and understand concretely, the concepts. For example teach about rainy season when it starts raining.
- Use real clock and show the movement of arms and their functions.
- Give opportunity to the students to manipulate the winding keys by themselves and see the movement of minute hand and hour hand.
- As a next step children need to develop an understanding of *passage* of time.
- ☆ See that the students concretely visualise the movement of the arm in the clock to notice the passage of time.
- ☆ Plan activities such as tapping foot for one/two minutes/ standing on one foot/jumping, to understand short intervals of time.

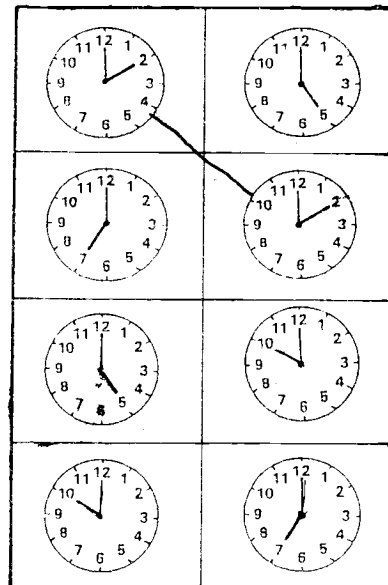
- ☆ Teach students the concept of “how long” by having them observe the time spent on classroom activities and TV shows.
- ☆ Draw the attention of the students to the position of the arms in the clock and their movement to show time at the beginning and ending of a class. Relate it to school bell.
- ☆ Have students estimate the duration of one minute in a variety of activities, such as closing their eyes and listening to music. Allow them to experience that the speed of the activity does not determine the speed of the passage of time.
- ☆ A student can be trained to understand and perform activities for a given duration even if he has not learnt to read a clock. For instance, let us take a student at primary class level who has to complete a target activity in 20 minutes (colouring a picture), starting at 11.10 A.M. and finishing at 11.30 A.M. He may not be able to read a clock. But the teacher can sensitize him to the long arm on a clock and tell him “the long arm is at 2 now. I want you to have finished colouring when the long arm is at 6.” Thus the student relates the clock to the activity and the speed of work. Incase the student cannot read nunerals, you can give a model for reference to see the time in the clock for completing the task. This is a prerequisite for understanding relationship of time and duration and work output at vocational level.

- Teach students to read/tell time in hours and then the half-an-hour, quarter hour and minutes. Follow the sequence:
- ☆ Keep long arm constant at 12, and short arm at varied numbers to teach ___ O' clock. Thus the child sees and learns 2 O' clock, 6 O' clock and so on. Lastly teach both arms together at 12 for 12 O' clock.
- ☆ When the child has mastery with O' clock, have long arm at 6 and teach -.30 mins, 3.30, 7.30, 12.30, 1.30 and so on. finally teach 6.30 with both arms together at 6.
- ☆ Check for - O' clock and -.30 with minute hand in 12 or 6 and hour hand on any number (2.30; 4.00; 8.00; 4.30;) to make sure the student has not forgotten the earlier learning.
- ☆ Similarly teach -.15 and then -.45. with minute hand in 3 and 9 hour hand on any number (1-15, 7-15, 11-45, 4-45). Do not forget to check for 'O' clock and - '.30'.
- Use worksheets to teach time. 'To begin with, activities apart from using real clock/model, have students match and/or draw the arms seeing a model.

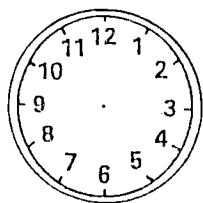
Tick (✓) the clocks that show same time in each row.



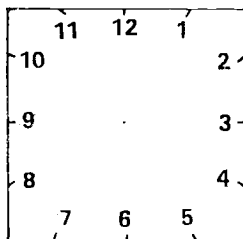
Connect the clocks that show same time with a line.



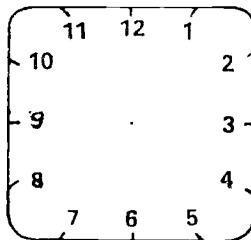
- Once the students learn to set time, match/draw on the worksheets seeing a model. Ask students to show/draw a particular time on the worksheets or set time on the clock.



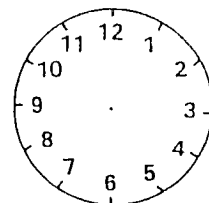
5-30



8-15



12-00

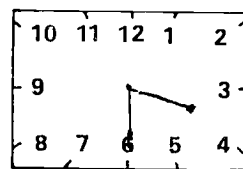
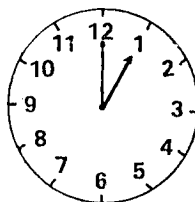
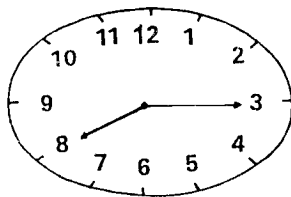
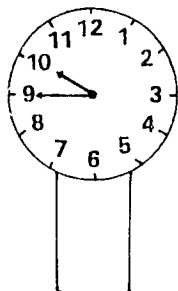


7-15

In each clock draw the time given below :

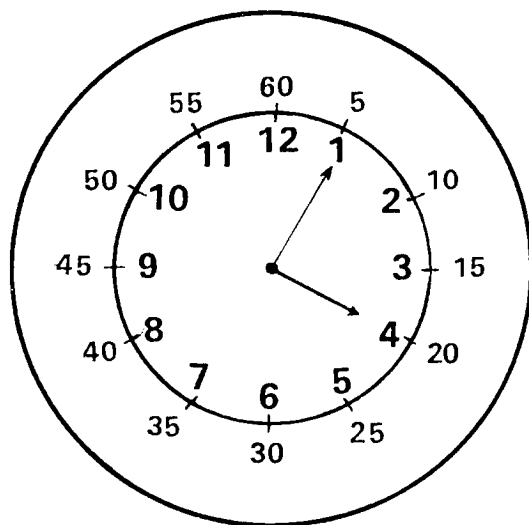
- Later ask students to read/write the time.

What is the time ?



- While giving practice, include previously learned task for maintenance of the task. For example, tell the student to set 4 O'clock on a model clock and ask him to wind the key to move long arm to 6. Tell him/her that the time now is 4.30. Following this you can ask him to draw/match or point out to the clock showing the same time on the worksheet.

- Once students learn to tell time in hours, half-an-hour and quarter hour, teach students to tell time in 5 minutes. Telling time in minutes will be easy to a student who knows multiplication table 5. If not, attach a ring with minutes on the clock to serve as a cue in the initial stages of learning. Instruct the student to read the inner number for short arms and outer number for long arm. Initially use colour coding to relate the minutes to long arm. Use one colour to outer dial and long arm and another to short arm and inner dial numbers. Once they learn, this can be faded off to one single colour (black) and without outer dial indicating minutes. However, students can use the clock with outer dial (minutes) to check their answers by themselves to correct their performance. If the student is found not capable of learning this with best of teaching. Consider reading time in quarters as functionally adequate.



- The arm for seconds found in some of the watches confuse students. Just tell them that the arm helps to know whether the watch is functioning or stopped as that is what most of us use it for !!
- Relate activities and teach them A.M. and P.M. as each hour occurs twice in 24 hours.

Introduce a digital clock to children who recognise numerals upto 60. Sensitize them to the dot between hour and minute (2:30) and teach them to read. Such watches are relatively cheaper and serve the function of reading time.

Capacity, Weight and Mass, Length and Distance

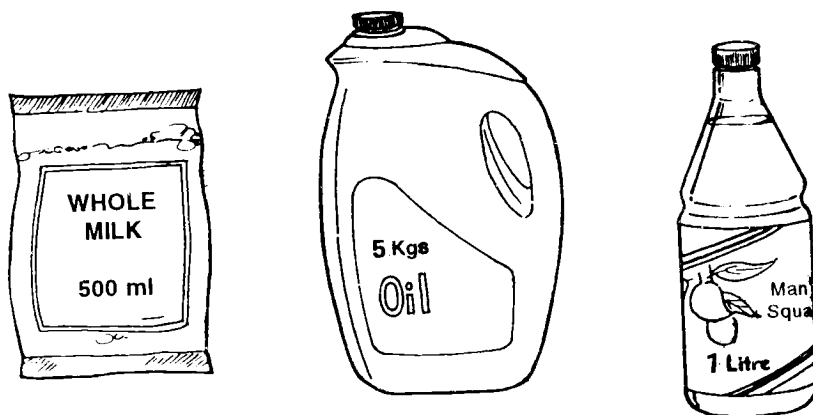
We use measurements in the day-to-day activities. We find 'how much', 'how long', 'how far' used in the conversation very frequently to make vital decisions. Comparative statements like more/less, big/small, heavy/light, long/short and far/near are found in any conversation irrespective of the topic of discussion. To have these concepts meaningfully used, the retarded student needs to be taught in context with practical experience. As these measurements are absolutely essential for daily living, alternative methods of teaching and adaptation of measuring scales can be considered for those who fail to learn to use the regular ones.

Capacity

Introduce to the students the fact that liquids such as water, milk, petrol and oil are measured in the unit of litres (lit) and milliliters (ml) to refer to the capacity. Sometimes, liquids are measured in Kg. also, such as in refined cooking oil.

- Allow them to watch and experience that all liquids do not have the same consistency.
- Let them also experiment and learn that liquids take the shape of the container and thus the same quantity will not maintain the same surface level in all the containers. Explain that this necessitates standard unit to have the quantities measured and **litres** are used for this purpose.
- Introduce the measure of litre, half litre and so on. The use of quarter, half and one litre containers will help in understanding of capacity.
- In home and in school, have students initially measure water, with the measuring cups. Write in bold letters the measurement ($\frac{1}{4}$ lit, $\frac{1}{2}$ lit, 1 lit, etc.) on the measuring cups which may be faded as the students learn to recognise the correct measuring cups. Let them also use measuring spoons as it is a prerequisite for cooking skills. Sensitize them to “tbs” for table spoon and other relevant abbreviations.

- Give practical experiences of use of measuring cups for making soft drinks, measuring milk, and other liquids. Incorporate in classroom activities and do not forget to give instruction for extending activities at home.
- Take them to shops and show how the liquids are measured and poured.
- Introduce them to sachets such as oil, milk, softdrinks, juice etc., Have them read the unit written on the sachets. Explain they are measured in advance and pre-packed for ease of use.



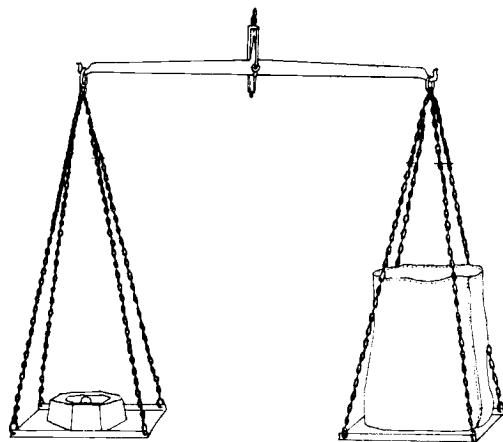
- Explain to the students that some liquid food items, such as soft drinks, oil, milk, phenyle, come in sealed tins/ bottles/packets. Show them how they are sealed when you buy/before opening to use the product.
- While filling petrol/diesel in the vehicle, show to the student how the litres are shown on the gauge. Explain that the process of measuring is mechanised and litre

cans are not used. However, sensitise him/her to the importance of checking for zero ('00') on the gauge before filling and look for the number of the required quantity on the gauge before paying.

Weight and Mass

Starting with the recapitulation of the concept litre, introduce to students the concept that weight gives an idea of how heavy an object or a person is. Therefore, the mass of any object or person is measured with the unit called **kilograms** (kg), which denotes the **weight**.

- ☆ Have students hold and compare the weight of different objects to know which one is heavy and which one is light. Start with gross differences and go to finer differences.
- ☆ Make students grade the weights of objects and place them. Use bean bags/sand bags or any other objects in containers to hold and see the differences in weights and to place them in order.
- ☆ Introduce weights while teaching numerals as a generalising activity.
- ☆ Plan activities where in students measure flour, dal, sugar and other commodities to have first hand experience of learning

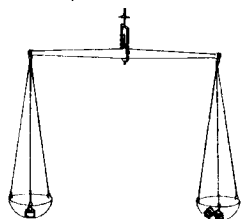
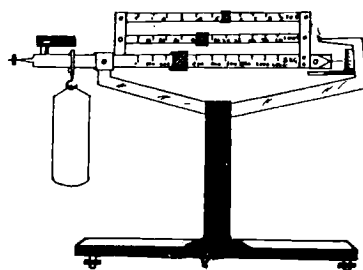
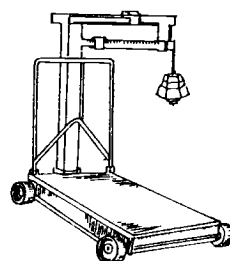
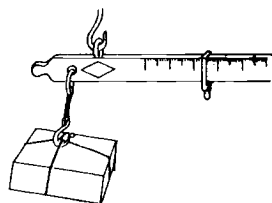
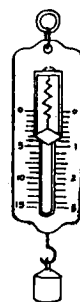
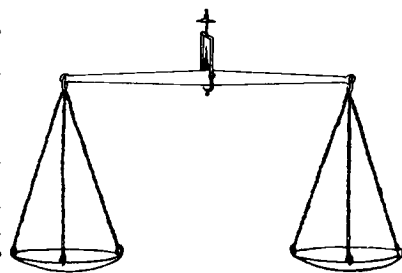
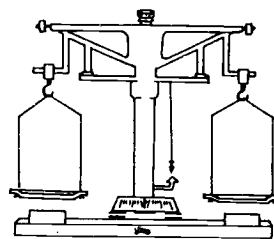


weights. The activities may become a part of cooking skills to students in school and at home.

- ☆ Allow the students to learn from experience, the various tools used to measure the weight - weighing scale for people, balance in provision/grocery shop, huge balance at wholesale shops, small balance at Jewellery shops, weigh bridge for goods in trucks, and big weighing machines in railway stations and so on.

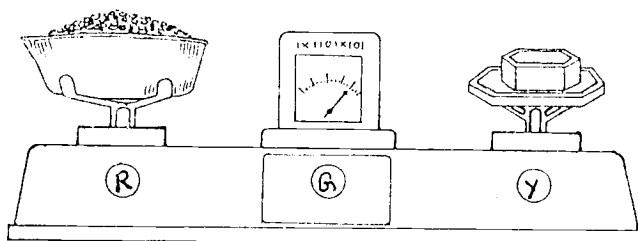
- ☆ Highlight that **all** the above give the **weight** of a mass, may it be material or person and the weight has the unit of kilogram (kg) and grams (gms).

- ☆ Sensitize the students to the printed weight with the abbreviation kgs/gms on the cover/cartons while buying commodities such as tooth paste, soap, dal, rice, biscuits and other items.



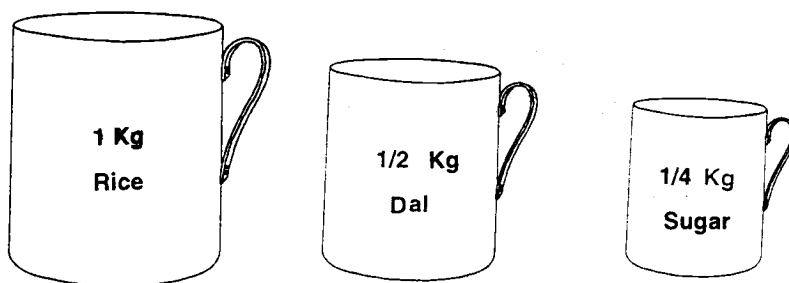
- ☆ Make suitable adaptations with light or sound in weighing machines to indicate more/less/equal measurement of weight for students who have difficulty in measuring correct amount using regular weighing machine.
- ☆ In regular balance, some kind of visual (colour light) or auditory (sound) cues for adding/removing of grains will further enhance the learning of students.

All through the daily activities from waking up to going to bed, there are numerous ways in which mass is weighed and used. Eg. spoonfuls of sugar, salt and other items for cooking, kilos of vegetables, and grocery items, old news papers sold by weighing in kilos. Sensitize a retarded student on every available opportunity to experience, understand and apply concept of weight and mass.



- ☆ When the student is trained for weighing and packing in given weights as a wage earning job skill, make sure that he learns to weigh perfectly, as consumer items cannot have imperfect quantities weighed and packed.

- ☆ If the student cannot weigh perfectly using weighing machines, adapt the process to ***volume*** measurement. Provide jars that perfectly measure a commodity to ascertain weight. Write the weight and commodity on the container. Also draw the item which will be useful for students who do not read. Allow the student to learn to fill upto the brim flatly and pour into its bag for sealing.



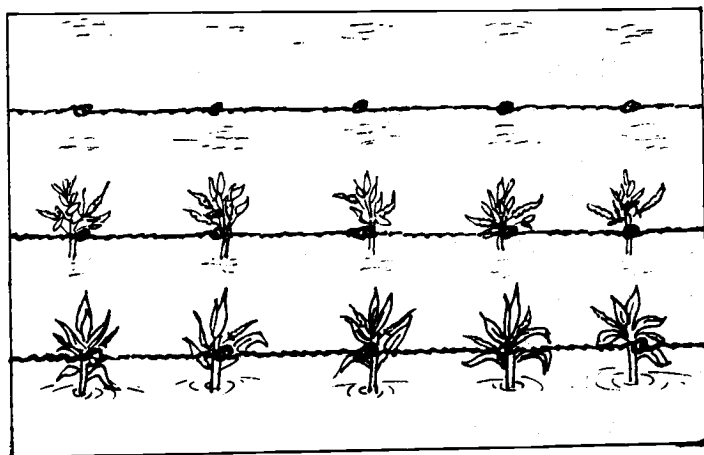
- ☆ Use of electronic weighing machine is found suitable for students with mental retardation.
- ☆ While travelling, show how luggage is weighed. Relate to the concept of more weight leads to payment of more money.

Length and Distance

Length of objects and height of persons is measured in metres (mts) and centimetres (cms). Distances between places are measured in kilometres (kms). Opportunities to use this concept are numerous in daily living.

- ☆ Let the students measure the length of the black board and the window with a rope. Make them see the difference in length to note which is longer. Experiences of similar nature may be provided to see the relative difference in length between and among the objects.
- ☆ Make students to mark the heights of their class mates. Discuss who is the tallest/the shortest in the class and who is taller/shorter than whom in the class.
- ☆ Allow the students to use a tape/scale and measure any given object - table, books, chair, ground, box, door, window..... Introduce the terms **length and breadth**. Give ample experiences. Sensitize to cm and mm written on the scale.
- ☆ Similarly allow them to measure each other's height as a classroom activity. Introduce the term '**tall/height**' and explain that anything/person / when erect or vertical is referred to as height/tall. Any horizontal measurement is referred to as **length**.
- ☆ As a next step allow measuring three dimensional objects and the concept of **length, breadth and height/depth**. Let them experience the difference between **height** and **depth** with ample examples. (Eg. height of a man, a tree, a building; depth of a well, a tank, a pit, a utensil and so on).

- ☆ Job oriented skills which are relevant here may be work skills in tailoring shops, cloth shop (wholesale and retail), cartons or box making and packing units, gardening, building construction sites and so on.
- ☆ As done in mass, adapt the measuring instrument to suit the student's need. For instance, in gardening, if every metre has to have a sapling planted, allow the student to mark the metres. Having ropes with a knot at every metre and making the student mark the area to be planted based on the knots is one way of adapting measurement to suit the needs.



Distance

Distance in terms of time taken to travel from home to school by various means is a very functional curricular content. Have conversation on how long it takes to go to a shop by walk, by scooter, and by bus. Let students compare

the time taken to reach the shop by different modes. The relative expense involved in using different modes of transport should be explained so that the students understand monetary implications.

- ☆ Introduce the concepts far and near before using the terms meters and kilometers.
- ☆ Ask questions such as who is sitting far away from the teacher and who is sitting nearer to teacher, who is sitting near the door and who is sitting far from the door..... you can also use picture charts for teaching far and near concepts.
- ☆ Conduct sports like javelin throw, shot put or throwing the ball. Let students measure the distance in terms of meters and write against each student's name. Discuss who has thrown farthest, nearest and so on. You can also place the rope on the ground after each student throws. Let the students see who covered longer or shorter distance.
- ☆ During practical exercises make sure that the students read the unit sign (kms., cms, etc.) and write if they are capable of writing.
- ☆ While travelling on the roads, draw the students' attention to the sign boards and milestones that show the place and distance in kilometres. Use maps to show distances.
- ☆ Show in the vehicles, the kilometer reading and explain what it means.

- ☆ Explain what is a 'walkable' distance and how it differs from person to person based on age, and health conditions. Take this opportunity to say that walking is a good exercise for general health and take the parents' help in inculcating this habit.
- ☆ Travel skills for longer distances and the travel related social behaviour for bus, train, auto, private vehicle and other modes need ample exposure and experiences to students with mental retardation.

Measurements and Computations

All the measurements discussed till now need to be incorporated in the mathematical computations. Numerous "story sums" in relation to functional situations should be provided to the students and taught to perform so that they understand the relationships. A few exercises can be:

- ☆ Mother bought 3 litres of milk. Sister used one litre for making coffee. How much milk is left over?
- ☆ Daddy bought 2 kilos of mangoes, 2 kilos of grapes, 1 kilo of apples. Altogether how many kilos of fruits did he buy?
- ☆ If one kilo rice costs Rs. 10.00 what is the cost of 5 kilos of rice ?
- ☆ Ramu's height is 135 cms., Sundar's height is 150 cms., Who is taller ?

- ☆ From Anjali's house, market is 5 kms. away and Post office is 7 kms. away. Which place is nearer ?
- ☆ Mahesh bought 500 gms. of sugar. His mother bought 250 gms. of sugar. Altogether how much sugar did they buy ?
- Ask children to measure and cut a certain length of paper. Allow them to construct a design out of it.
- Have them individually throw the ball and then make them measure the distance (as in shot put). Reward the student who has thrown farthest.
- Give them each different litre measures ($\frac{1}{4}$, $\frac{1}{2}$, 1 and 2 litres). to fill in liquids so that they can see the differences in the quantities of the liquid.
- Ask one student to count how many times he poured with $\frac{1}{2}$ a litre measure to fill a 2 litres measure and ask another student to count how many times he poured with $\frac{1}{4}$ litre measure to fill in a 2 litre measure. Then ask them who poured more number of times and who poured less number of times. Explain why. Give different coloured water to sustain their interest.

Remember that the sums are related to daily activities that helps in generalisation of learned concepts. Develop sums to suit each student's socio economic background and environment so that he is really able to visualise it and find the functional utility.

- Similarly have each student use a particular weight ($\frac{1}{4}$ / $\frac{1}{2}$ / $\frac{3}{4}$ / 1 kg and 2 kg. weighing stones) and measure. Let them see the difference in mass weighed with $\frac{1}{4}$ and $\frac{1}{2}$, or $\frac{1}{2}$ and 1kg and soon.

Above all generate ideas with your own creativity and experience, based on the students' abilities and needs. There is no match to teacher competency combined with common sense to achieve the objective, when we deal with students who have mental retardation.

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APPENDICES

The following pages contain list of functional words in Hindi, Telugu and English. Functional words are frequently used and required for persons with mental retardation to function independently at home, school, neighborhood and community. The functional words in alphabetical order are listed, followed by nouns in categories, pronouns, verbs and prepositions. It is not necessary that one has to follow the sequence or order while selecting the words for teaching. However, the words may be selected in such a way that it follows a sequence i.e., from the most frequently used words to the least frequently used words in conversation. For example, functional words related to body parts, food items, vegetables, fruits and so on which are familiar and very much in use in the student's environment are to be selected for teaching in the beginning. Words in use in the student's environment, but not listed here can be added. Teachers are welcome to make their own list in their regional languages as well as alternate terms in use for certain words.

Appendix - I

शब्द सूची - हिन्दी

हिन्दी वर्णमाला के अनुसार कार्यात्मक शब्द

अनार	आम	इमली	ईंट	उल्लू
ऊँट	एड़ी	ऐनक	ओखली	औरत
कमल	खरगोश	गमला	घड़ी	चम्मच
छतरी	जहाज	झरना	टमाटर	ठहरो
डमरू	ढोलक	तबला	थाली	दरवाजा
धरती	नल	पतंग	फल	बकरी
भजन	मछली	यंत्र	रस्सी	लड्डू
वस्तु	शतरंज	विष	संतरा	हल
क्षत्रिय	त्रिशूल	ज्ञानी		

संज्ञा

शरीर के अंग

आँख	नाक	कान	मुँह	माथा	होठ	दाँत
जीभ	गाल	गर्दन	पैर	हाथ	घुटना	कोहनी
उँगली	टाँग	कंधा	भौंह	पेट	एड़ी	अंगूठा
नाखून	बाल	कमर	बाँह			

सब्जियाँ

प्याज	आलू	बैंगन	बीन्स	मिर्च
भिंडी	तोरी	अदरक	लहसुन	पत्तागोभी
फूलगोभी	गाजर	मूली	चुकन्दर	खीरा
धनिया	कढ़ीपत्ता	चिचिंडा	करेला	सेम टिन्डा
टमाटर	पालक	शलजम्न	कुन्दरू	लौकी
कद्दू	नीबू	अरबी	सहजन	परवल

फल

केला	आम	अंगूर	नारंगी	अंजीर
कटहल	सेब	जामुन	शरीफा	मौसंमी बेर
तरबूज	खरबूज़ा	बेल	अनार	आलूबुखारा
अमरूद	पपीता	लीची		

फूल

गुलाब	लिल्ली	कमल	सूर्यमुखी	गेदां
गुढहल	रातरानी	बेला	कनेर	चाँदनी
गुलदाउदी	चमेली	चंपा		

खाने की चीजें

चावल	दोसा	पेड़ा	रसमलाई	वडा
दाल	बरफी	खिचड़ी	रसम	छोले
रसगुल्ला	नीबू चावल	दूध	घी	गुलाबजामुन
चटनी	इमली चावल	केक	राजमा	मैसूरपाक
खीर	जलेबी	पुलाव	लड्डू	खोया
इडली	मटर पनीर	रोटी	रबडी	सब्जी
पालक पनीर	मटर	दही	खढी	चीनी
गुड़	हलवा	लस्सी	पोहा	चाय
कॉफी	ढोकला	श्रीखंड	समोसा	चाट
भेलपूरी	पराठा	बिस्कुट	मलाई	

जानवर

गाय	बैल	गीदड़	मछली	कुत्ता	हिरन
लोमड़ी	बिल्ली	हाथी	साँप	सूअर	शेर
बिच्छू	घोड़ा	कछुआ	बन्दर	गधा	खरगोश
चूहा	कुत्ता	भैंस	चीता	बकरी	भालू
ऊँट	गिलहरी	ज़िराफ	मेंढक	बाघ	

चिडियाँ

कौआ गौरैया तोता मैना मुर्गी कबूतर मुर्गा
हंस कोयल बत्तख सारस बगुला मोर उल्लू
चमगाड़ गिद्ध

कीटक

छिपकली मच्छर खटमल मक्खी कॉकरोच
मधुमक्खी केकड़ा दीमक पतंगा बिच्छु चीटीं

वाहन

जीप	कार	साइकल	रिक्शा
हवाई जहाज	जहाज़	नाव	रेलगाड़ी
ऑटोरिक्शा	ट्रेक्टर	बैलगाड़ी	स्टीमर
बस	वैन	टॉगा	ट्रक
मोटर साइकल	मोपेड	हेलिकॉप्टर	लौरी

कपड़े

पैंट	कमीज़	निक्कर	बनियान	लहंगा
ब्लाउज	चुड़ीदार	पैज़ामा	सलवार	चप्पल
कुर्ता	धोती	साड़ी	लुंगी	फ्रॉक
टी शर्ट	मफलर	टोपी	टाई	रूमाल
शाल	मोज़ा	जैकेर	कोट	जूता

घरेलू सामान

कुर्सी	बेंच	बल्ब	ट्यूब लाईट	पंखा
अलमारी	खिड़की	रस्सी	कार्पेट	दरवाज़ा
सुई	कैची	बोतल	बिन्दी	माला
चेन	कंधी	काजल	पाउडर	तेल
पायल	झोला	फोन	टी. वी.	कुंडी
बटन	चूड़ी	धागा	कूलर	खिलौना
पर्दा	मोमबत्ती	रेडियो	अगरबत्ती	ताला
किताब	खाट	बाल्टी	मग	चाबी
आईना	तकिया	रज़ाई	कम्बल	चदर
घड़ी	गद्दा	दरी		

रसोई का सामान

गिलास	थाली	चम्मच	कप	स्टोव
तवा	लोटा	कटोरी	भगोना	कूकर
चक्ला	केतली	बेलन	कढ़ाई	मिक्सी
सिल्वेदा	फिल्टर	पतीला	छुरी	काँटा
ड्रम	मसाला डब्बा	माचिस	गैस	चिम्टा
छल्ली	नल	बेसिन	तस्ला	

लेखन सामग्री

पेपर	पेन	पेन्सिल	रबड़	बोर्ड
किताब	बैग	कैलेंडर	गम	कलर पेन्सिल
कटर	स्केल	काँपी	चॉक	क्रेयान्स
पेन्सिल बाक्स	गोंद	पेन्सिल-बॉक्स	स्केच-पेन	

घर के सदस्य

माँ	पिता	मौसी	चाचा	चाची	
मामा	मामी	बुआ	बहन	भाई	फूफा

दादी	नानी	दादा	नाना	लड्डका	लडकी
बेटा	बेटी	पोता	पोती	भतीजा	भतीजी
भान्जा	भान्जी	साला	साली	पत्नी	पिता
ममेराभाई	ममेरीबहन		चचेराभाई		चचेरीबहन
सास	ससुर	भैया	दीदी	ताऊ	ताई
ननद	जीजा	देवर	भाभी		

व्यावसायिक व्यक्ति

डाक्टर	नर्स	डाकिया	सिपाही	अध्यापक
चपरासी	धोबी	नाई	सोनार	बढ़ई
मोची	मिस्त्री	कुली	किसान	वकील
ड्राइवर	दर्जी	दुकानदार	फोटोग्राफर	माली
जुलाहा				

रंग

लाल	पीला	नीला	हरा	काला
सफेद	गुलाबी	नारंगी	बैंगनी	आसमानी
जामूनी	भूरा			

सर्वनाम

मैं	मेरा	हम	हमारा	वह	उसका
उसकी	तुम	आप	तुम्हारा	आपका	वे
यह	ये	हमलोग	उनका	उनकी	हमें
मुझे	उन्हे	अपना	अपनी	इन्हे	

क्रियायें

पीना	खाना	चलना	दौडना	कूदना
चढ़ना	देना	साफ करना	देखना	सुनना
छोना	काटना	खेलना	पढ़ना	लिखना
सिलाना	सुखाना	रोना	खड़ेहोना	जाना
आना	लेटना	तैरना	खींचना	गाना
चिपकाना	नाचना	हँसना	मारना	निचोड़ना
सोना	उठाना	टूटना	घूमना	रुकना
खोलना	उतारना	टाटा करना	फेकना	

पूर्व सर्ग

पर	ऊपर	नीचे	नज़दीक	बगल में
पीछे	सामने	पहले	बादमे	अंदर
बाहर	आगे	बीच में	दाँए	बाएँ दूर

समय

आज	कल	परसों	सुबह	दोपहर
शाम	रात	सप्ताह	हफ्ता	धण्टा
रोज़	दैनिक	सलाना	महीना	छमाही
हर दिन	हर घंटा	त्रैमासिक	छः महीने	वर्ष

Appendix - II

పదములపట్టిక - తెలుగు

తెలుగు వర్ణమాల ప్రకారము కార్యకారి పదములు

అరటి	ఆవు	ఇల్లు	ఈక	ఉడుత
ఊయల	ఎలుక	ఏనుగు	ఐదు	ఒంటె
ఓడ	ఔషధము	కలము	ఖరము	గంప
ఘటము	చంచ	చత్రి	జడ	ఝండ
టపా	కంతము	థంక	తల	కథ
దండ	ధనము	నగలు	పలక	ఫలము
బంతి	భజన	మందు	యంత్రము	రవ్వకేసరి
లత	వల	శరము	విషము	సరము
హంస				

నామవాచకములు

శరీరభాగములు

కన్ను	ముక్కు	చెవి	నోరు	నుదురు
పెదవి	పళ్ళు	నాలుక	చెంప	మెడ
కాలు	చెయి	మోకాలు	మోచేయి	వ్రేలు
గోరు	కనుబొమ్మ	కడుపు	పొదము	మెడిమ
భుజము	వెంట్రుకలు			

కూరకాయలు

ఉల్లిపాయ	ఆలుగడ్డ	వంకాయ
బెండకాయ	బీన్సు	చిక్కుడుకాయ
కాకరకాయ	బీరకాయ	సొరకాయ
మిరపకాయ	అల్లము	ముల్లంగి
వెల్లులి	దోసకాయ	దొండకాయ
బీట్‌రూట్	క్యాబేజి	క్యారెట్
కాలిఫ్లవర్	పాలకూర	గోంగూర
మెంతికూర	తోటకూర	కొత్తిమీర
కర్వేపాకు	టమాట	ములగకాయ
నిమ్మకాయ	చామగడ్డ	

పండ్లు

అరటిపండు	మామిడిపండు	జామపండు
ద్రాక్ష	నారింజ	నేరేడిపండు
అనాసపండు	మోసంబి	రేగిపండు
పుచ్చకాయ	పనసపండు	సీతాఫలము
దానిమ్మకాయ		

పువ్వులు

గులాబి	మల్లె	సన్నజాజి	విరజాజి
చామంతి	మందార	కనకాంబరం	సెంటుజాజి
సంపెంగ	ప్రొదుతిరుగుడు	లిల్లి	తామర
గన్నేరు	బంతిపువ్వు		

ఆహారపదార్థములు

అన్నము	చపాతి	ఇడ్లీ	వడ
దోస	కూర	చారు	పప్పు
రసం	పరోటా	పాలు	జ్యోసు
పెరుగు	మజ్జిగ	పులిహోర	నెయ్యి
కేకు	పచ్చడి	భీరు	జిలేబి
మామిడితాండ్ర	పాయసం	లడ్డు	కోవా
మైసూర్పాక్	కిచడి	పులావు	చోలె
రోటి	రాజమా	పన్నీర్	చాక్లెట్
గులాబ్జామూన్	రసమలాయి	రసగుల్ల	ఉప్పా
సమోసా	బిస్కెట్	కాఫీ	టీ

జంతువులు

ఆవు	కుక్క	పిల్లి	గుర్రము
గాడిద	బర్రె	పంది	కోతి
జింక	ఎనుగు	సింహము	ఎద్దు
తాబేలు	పాము	తేలు	కుందేలు
పులి	ఎలుగుబంటి	మేక	నక్క
ఉడుత	చిరుతపులి	జిరాఫి	కప్ప
చేప			

పక్షులు

కాకి	పిచ్చుక	చిలుక	గోరింక	పావురము
కోడిపెట్ట	కోడిపుంజు	కోకిల	నెమలి	హంస
బాతు	కొంగ	పాలపిట్ట	గుడ్లగూబ	డేగ

కీటకములు

బల్లి	నల్లి	బొద్దింక	చీమ	ఈగ
దోమ	తూనీగ	ఎండ్రకాయ	చెదలు	నత్త
జలగ	తేలు	సీతాకోకచిలుక	సాలెపురుగు	

వాహనములు

జీపు	కారు	సైకిలు	బస్సు	రిక్షా
విమానము	ఓడ	నౌక	రైలు	టాంగా
ఆటో	ఎద్దులబండి	ట్రాక్టరు	లారీ	వ్యాన్
స్కూటరు	మోటార్ సైకిలు	హెలికాప్టర్	గుర్రపుబండి	

దుస్తులు

ప్యాంటు	చొక్క	చీర	జాకెట్
చుడిదార్	షల్ వార్	కమీజ్	లంగా
బనియన్	వోణి	పంచ	నిక్కరు
పైజామా	లాల్చి	టై	టోపి
చేతిరుమాలు	స్వెట్టరు	దుప్పటి	శాలువ
సాక్స్	చెప్పులు	బూట్లు	

వస్తువులు

కుర్చి	బల్ల	లైటు	ఫ్యాను
అలమెర	బీరువ	కిటికి	తలుపు
గొళ్ళెము	నూది	దారము	కత్తెర

గుండీలు	ఔలిపోను	తోలునంచి	గాజాలు
బొట్టు	గజెలు	కుంకుమ	తిలకము
కాటుక	పాడరు	దువ్వెన	నూనె
ఉంగరము	గొలుసు	దండ	రజాయి
బూట్లు	అద్దము	దిండు	మంచము
టిఫిన్ బాక్స్	గజెలు	పాడరు	బకెటు
చెంబు	తాళము	తాళముచెవి	చీపిరి
సబ్బు	టీవి	బొమ్మలు	కర్టెను
తీగ	కొవ్వొత్తి	డబ్బా	కూలర్
కిటికి	గొడుగు	ఫ్రెజ్జి	బల్ల
చెప్పులు	సాప	గోడగడియారము	రేడియో
పరుపు	దుప్పటి	దిండు	

వంటింటి సామాన్లు

గ్లాసు	పేట్లు	స్పూను	గిన్నె	కప్పు
కడాయి	బిందె	గంప	గరిట	పెనము
పీట	రోలు	రోకలి	రుబ్బురోలు	మిక్సీ
గ్యాస్ స్టవ్	అట్లకాడ	డేక్ష	కుండ	గ్రైండరు

డబ్బా	కత్తి	చాకు	డ్రమ్ము	జాడి
అగ్గిపెట్ట	పట్టకార	జల్లెడ	చేయిగరిట	ఫ్రిడ్జి
ఫిల్టర్	కాడగిన్నె	కత్తిపీట	పోపులపెట్టి	
బొగ్గులపొయ్యి				

వ్రాతసామగ్రి

పేపరు	పెన్ను	పెన్సిల్	రబ్బరు
స్కేలు	పుస్తకము	పెన్సిల్బాక్స్	షార్ప్నర్
క్యాలెండర్	గమ్	స్కూల్బ్యాగ్	క్రేయాన్

కుటుంభసభ్యులు

అమ్మ	నాన్న	పిన్ని	బాబాయి
అక్క	అన్న	చెల్లి	తమ్ముడు
తాత	అవ్వ	బాలుడు	బాలిక
కూతురు	కొడుకు	మనవడు	మనవరాలు
పెదనాన్న	పెద్దమ్మ	చిన్నాన్న	చిన్నమ్మ
అత్తయ్య	మామయ్య	బావ	వదిన
మరిది	కోడలు		

వృత్తిపనులు చేయువారు

డాక్టరు	నర్స్	పోస్టుమాన్	పోలీస్
టీచరు	వాచ్మన్	చాకలి	మంగలి
కంసాలి	వడ్రంగి	మేస్త్రి	సాలెవాడు
రైతు	కుమ్మరి	న్యాయవాది	దర్జీ

రంగులు

ఎరుపు	నలుపు	తెలుపు	పసుపు
ఆకుపచ్చ	గులాబి	నీలము	కాషాయము
నారింజ	గోధుమరంగు		

సర్వనామములు

నేను	నాది	నీవు	నీది	మేము
మనము	ఆమె	ఆమెది	అతడు	అతనిది
వారు	వారిది	వాళ్ళు	వాళ్ళది	వీరు
వీరిది				

క్రియ పదములు

త్రాగుట	తినుట	నడచుట
పరుగెత్తుట	దూకుట	ఎక్కుట
కడుగుట	చూచుట	వినుట
ఆడుట	చదువుట	వ్రాయుట
కుట్టుట	కత్తిరించుట	అంటించుట
ఉతుకుట	ఆరవేయుట	తరుగుట
నిలబడుట	నాట్యముచేయుట	పోవుట
వచ్చుట	నవ్వుట	ఏడ్చుట
తుడుచుట	విసరేయుట	దులుపుట
ఈతకొట్టుట	త్రోయుట	లాగుట
పాడుట	ఆటలాడుట	కొట్టుట
టాటాచెప్పుట		

విభక్తిప్రత్యయములు

క్రింద	మీద	పైన	దగ్గర	దూరము
ప్రక్కన	వెనుక	ముందు	లోపల	బయట
మధ్య	కుడి	ఎడమ		

సమయము

మొన్న	నిన్న	ఇవ్వాళ	ప్రొద్దున
మధ్యాహ్నము	సాయంత్రము	రాత్రి	రేపు
ఎల్లుండి	రోజు	వారము	నెల
మూడునెలలు	ఆరునెలలు	సంవత్సరము	

Appendix - III
WORDS LIST - (ENGLISH)
Functional words in alphabetical order

ant	boy	cot	dog	egg
fan	goat	hen	icecream	jam
kite	lamp	monkey	nose	orange
parrot	queue	rose	sun	train
umbrella	van	water	Xroads	you zoo

NOUNS

Body parts

eye	nose	ear	mouth
forehead	lip	teeth	tongue
cheek	neck	leg	hand
knee	elbow	finger	shoulder
eyebrow	stomach	foot	ankle
toe	nail	hair	waist arm

Vegetables

onion	potato	brinjal
beans	chillies	lady's finger
bottlegourd	ginger	garlic

cabbage	cauliflower	carrot
radish	beetroot	cucumber
coriander	curryleaves	snake gourd
bitter gourd	tomato	turnip
french beans	lime	arbi
drumstick	coconut	

Fruits

banana	mango	guava	grapes
orange	fig	jack fruit	apple
custard apple	sweetlime	cherries	papaya
watermelon	pineapple		

Flowers

rose	jasmine	marigold	lily
sunflower	shoe flower	hibiscus	lotus

Food items

rice	chapati	idli
vada	dosa	curry
rasam	dal	parota
milk	juice	curds
buttermilk	ghee	lemon-rice

tamarind rice

kheer

laddu

roti

rajma

rasgulla

tea

bhelpuri

palak paneer

cake

jilebi

kova

chole

muter panner

halwa

coffee

biscuit

subji

chutney

mango jelly

mysore pak

pulav

sugar

upma

samosa

chocolate

lassi

Animals

cow

dog

cat

pig

horse

donkey

buffalo

rat

goat

ox

deer

elephant

lion

tortoise

rabbit

tiger

bear

jackal

fox

snake

scorpion

leopard

squirrel

giraffe

frog

fish

Birds

crow

sparrow

parrot

myna

hen

pigeon

cock

swan

nightingale

duck

crane

woodpecker

Insects

butterfly	lizard	fly	mosquito	ant
cockroach	bee	leech	crab	snail
bedbug	whiteant		scorpion	

Vehicles

jeep	car	cycle	bus
rickshaw	aeroplane	ship	boat
train	auto	tractor	steamer
bullock-cart	truck	motorcycle	tonga
scooter	moped	helicopter	lorry van

Clothes

pant	shirt	nicker	baniyan
long skirt	half saree	blouse	skirt
chudidaar	shalwar	t-shirt	dhoti
chappels	handkerchief	shawl	socks
frock	kurta	muffler	shoe
coat	tie	cap	jacket

Common objects

chair	table	light	fan
almirah	cupboard	window	door
needle	scissors	bottle	scale

bag	bindi	anklets	sindhur
kajal	powder	comb	ring
curtain	toys	taperecorder	clock
bed	pillow	bulb	bucket
candle	mat	mug	broom
lock	key	stool	T.V.
telephone	radio	carpet	bedsheet
blanket			

Kitchen items

glass	plate	spoon	dish
cup	frying pan	gas-stove	saucer
mixie	grinder	chakla	belan
vessel	masala box	sauce pan	knife
drum	strainer	matchbox	gas
lighter	refrigerator	chimta	tins
filter	tap	washbasin	pickle
jar	cleaning powder		

Stationery items

paper	pen	pencil	eraser
chalkpiece	book	note book	bag
pencil box	drawing note	scale	sharpner
calendar	colour pencils	crayons	gum

Family Members

mother	father	aunty
uncle	sister	brother
grandmother	grandfather	boy
girl	daughter	son
grandson	granddaughter	brother-in-law
sister-in-law	niece	nephew
cousin	mother-in-law	father-in-law

Community helpers

doctor	nurse	post-man	police
teacher	watchman	dhobi	barber
goldsmith	carpenter	cobbler	mason
weaver	farmer	painter	lawyer
photographer	gardener	soldier	tailor
shopkeeper	driver		

Colours

red	black	white	yellow	green
pink	blue	orange	violet	brown

PRONOUNS

I	my	mine	we	me	she
her	hers	he	she	his	him
ours	our	they	their	theirs	you
your	yours				

VERBS

drink	eat	walk
run	jump	climb
wash	clean	see
hear	play	write
stitch	cut	rinse
dry	cry	stand
go	lay	wipe
throw	dust	push
swim	pull	sing
sleep	read	

PREPOSITION

in	on	under	up
down	near	beside	behind
between	in front of	before	after
left	right		

TIME

yesterday	today	tomorrow	
morning	evening	night	hours
daily	weekly	monthly	
quarterly	half yearly	annually	
day before yesterday		day after tomorrow	