# Special Need Education Tool Design Using Cubical Database

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*Abstract*—**Teaching and learning process adopted various pedagogy and tools for effective knowledge transformation. It faced many challenges due to learner's attitude and the social environmental factors. Special Education factors are differing from one to another based on their need such as Hearing Impairment, Visual Impairment, Physical Handicap, Mental Handicap, Maladjustment and Learning Difficulties. The modern and computer aided teaching learning and e-pedagogy has involved various innovative adaptation to teach the essential and survivable knowledge to the special need students. This paper is focused on cubical representation of teaching learning objectives, challenges and the modern methodology or pedagogy are represented in a cubical manner and build the knowledge base for effective teaching learning process of special need Educational system**

*Index Terms*—**Pattern design, Cubical database, Special Need Education, Teaching Learning Methodology, e-Pedagogy**

## I. Introduction

Information technology and computer aided teaching learning process aided for learning process to all. This technology used for all type of skilled persons specially to the special need education learners. The World Heath Organization(WHO) , World Bank and United nations(UN) are taking many initiatives to bring the living condition to the special need education learners. Though they require special attention to learn and do their daily activities, the technology aided them helps to act as a normal human as equal to us. In the current pedagogy, the special need educations are addressed in a unique disability. For the each need different technology are used linked one with another based on their requirements. These requirements are designed and manipulated based on the required needs through technological devices as well and its supportive software's.

## II. Background Study

There are many technological changes come for the development and adaptation of Special Need Education (SNE) system. Today, Computers are one provision that could enhance the learning of SNE children. The use of terms such as "special needs" and the conception about SNE children Government and NGOs are initiating measures to review and plan appropriate strategies for special needs and inclusive education. These measures include evolving policy guidelines, analyzing, practices, developing teacher training programs, and creating resource persons and special teachers by establishing linkages to complement each other. These initiatives focused to Equal opportunities should be provided for all children to develop their potential to the full so that they can grow up to be active and responsible members of the community and achieve as much independence as possible.

The government of India, focus on children with disabilities has resulted in greater awareness and increased sensitivity towards these children. The launch of the District Primary Education Program (DPEP) in 1994 provided further impetus to existing efforts. The Equal Opportunities and Rights of Persons with Disabilities Act 1995 was comprehensive breakthrough legislation that provided for education and economic rehabilitation of people with disabilities. It states that free education for children with disabilities up to the age of 18 years must be provided in an appropriate environment. The government has recently launched the Sarva Shiksha Abhiyan (SSA). This proposes to implement 'universalization of elementary education' (UEE) in a mission mode with a focus on providing quality elementary education to all children in the age group 6–14 years. Inclusive education is an integral component of SSA, and promises to make 'education for all' a reality by 2010.Programmes launched in the recent past have been able to make only a limited impact in terms of increasing the participation of children with disabilities in formal education. This situation needs to change in the near future, and a focused effort is required. The initiatives are not able to meet the expected result due to various reasons as per the UNICEF report. The one of the major area to be strengthen to India is technology development and its implementation in the special education as per the individual as well as integrated disabilities.

## III. Computers in Special Education

Children with special need education includes those who are physically handicapped, moderately or severely learning disabled, blind and partially sighted, deaf and partially hearing, and any child who for some other reasons requires additional educational provision. The Warnock Report (1978) said that special education for these children should be interpreted and perceived, as much as possible, as "additional" rather than as "different." Goodyear and Barnard (1982) proclaim that computers can be used to help

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children with SNE in the following ways.

Firstly, computers can be used as a diagnostic aid in the sense that "a combination of educational and psychological testing tools with computer technology might greatly assist in the diagnosis of learning problems"(p. 63).Secondly, computers can be used as a learning environment. Through different software packages such as word processors, graphics and games, children can improve their ability to solve problems. Thirdly, computers can be used as a communication aid. Finally, computers can be used as a provider of feedback for children with special learning difficulties. The motivational power and the consistent response of children's reactions to video games have contributed much to learning by children with motor difficulties.

The computer aided learning system approached are aimed to support each disabilities. As per the study , the person facing the disability in one he/ she is having power to another sense. The supported software are developed in unique manner .After gathering this information, the Nation center for technology in Education (NCTE) recommends viewing software in different categories, each of which can be used for different purposes, and then choosing among the available products in a particular category. Before going to discuss the special need software we will discuss classification of special need and its types .

## IV. Special Education Need Types

Children are considered to have special educational needs if they cannot benefit fully from the curriculum provided for children of their age or if they cannot be catered for adequately in an ordinary educational setting. Children with one or more of the following characteristics can be considered as children with special educational needs (SNE children):

- Hearing Impairment
- Visual Impairment
- Physical Handicap
- Mental Handicap
- Maladjustment
- Learning Difficulties

We are going to discuss the nature of each special need attributes and their objectives related to teaching learning process .The SNE teaching learning process exposed to similar experiences, skills, concepts, values, etc as equal to the normal learners. However, the means to achieve these concept may be different and the rate at which to achieve them may also vary according to the abilities of individual children. These specific needs are targeted through the curriculum of individual special need attributes such as Hearing Impairment, Visual Impairment, Physical Handicap, Mental Handicap, Maladjustment and Learning Difficulties.

The special need education and the adopted technological system device and software help the children achieve personal development according to their individual differences. It prepares the children for living and functioning in their homes, the neighborhood and the community based on the learning objectives. This technological prospective scopes develop in the children study skills, a positive study attitude and good study habits for self-learning or for further studies. It enhance the children to work with skills, a positive work attitude and good work habits for vocational training or for work. The total process of SNE system as well the adopted technology devices and software help the children achieve as much independence as possible and become contributing members of the community. Here the factors are consider for the special need education system

- Profile and Learning Objectives
- Special need Character or disabilities
- Adopted technology device and software

The above specified factors together try to implement the teaching learning process with following goals. The technology based curriculum provides the practical approach to the implementation of teaching objective inline to the SNE curriculum to help the children make sense of their environment and construct within their minds a framework of knowledge. It develops a positive attitude towards learning and the children live lively, enquiring minds and to encourage in them independent thinking and rational judgments. It aids the children acquire, generalize and apply knowledge and skills in daily life and to train them in habits of rational thinking with all its components, e.g. observation, systematic information gathering, analysis, synthesis, deduction and induction. The above mentioned intellectual attributes are specified with communicative, social, moral and physical development .Before going to discuss more on the technology, the challenging attributes are their . Here for , an example we are going to analysis of the visual impairment is defined and discussed below.

### *A. Visual Impairment*

Persons with no visual function, i.e. no light perceptions are consider as a visual impairments .The partial visual impairments acuity differ from 6/18 to better than 6/60 .Similarly The moderate low vision group - people with visual acuity from 6/60 to better than 6/120 and the severe low vision group - people with visual acuity of 6/120 or worse or people with constricted

### *B. Learning difficulties for Visual Impairment*

As visual impairment imposes limitations on the children in such aspects as mobility, the range and variety of experiences and the ability to cope in different situations, visually impaired children may encounter different learning difficulties such as Perception and Concept Formation, Delay in Physical and Motor Developments, Problems in Social and Emotional Developments, Difficulties in Visual Functioning

Severely visually impaired children may suffer from delay in cognitive development, especially in perception and concept formation. These children may therefore have difficulties in obtaining visual information and in forming perception about people and things and what is happening in their environment. These difficulties will prevent them from consolidating their perceptual experiences into concepts. They have to obtain information through other sensory modalities, e.g. auditory, tactile, olfactory, etc. and the information obtained may be limited and confusing. The physical and motor developments of visually impaired children may be affected by their difficulties in spatial

orientation. They may have poor postures and poor hand control. They may easily bump into furniture, equipment and people. Visual impairment also has an impact on the social and emotional developments of these children.

Visual defects may affect the children's visual functioning. However, visual problems cannot be generalized. For example, some children may have poor near vision, while others may have tunnel vision, patchy vision, or they may be susceptible to strong light and glare. But no matter what their problems are their educational progress is invariably hampered by their visual defects. Generally speaking, visually impaired children may have difficulties in searching, scanning, and organizing visual information and in retrieving what has been dropped. They may be unable to read the blackboard, projected materials, print and diagrams of small sizes. As each child's problem is unique, strategies to cope with problems are highly individual.

Visually impaired children have to face more learning difficulties than ordinary children. With their limited experience, they normally have little or no learning skills. As there is little or no imitative learning through vision, their learning will also be slow and their attention span short. They may require more time to complete a task. With limited mobility, they may encounter difficulties when participating in classroom activities, games and outdoor activities. Low self-esteem and poor social skills may also lead to emotional and behavior problems. Visually impaired children with other additional disabilities may have even greater learning difficulties than those without. These difficulties are overcome with the help of effective teaching methods and the technological tools

### *C. Teaching approaches for Visual Impairment*

There are a number of teaching approaches which can be adopted to teach the visual impairment students through activities, role play, unit teaching, discovery method, programmed instruction, behavior modification, etc. We can follow the basic approach, Verbal Instructions, Management of Printed Materials and Diagrams, Classroom Organization and Management and Safety Precautions in Conducting Outdoor Activities, Sports and Games etc.

Visually impaired children cannot learn by imitation through visual experience alone. They need to do it through their other senses also, such as sense of hearing and sense of touch. Appropriate teaching aids should therefore be used to allow them to touch and learn from concrete experience. What they have learnt will thus be clearer and more accurate. Instructions and explanations given by the teacher should be clear and concise. The teacher should read out clearly everything written on the blackboard. When speaking to the children, he should first address them by their names to ensure attention. To make sure that the children understand what is taught, he should ask them questions when necessary.

According to the visual condition of individual children, the teacher should choose appropriate teaching materials to meet their individual learning needs. Printed materials and diagrams may have to be adapted by using contrasting colors, tactile marks, enlarged size, increased boldness, adequate spacing, etc. In producing tactile diagrams for these children, the teacher choose diagrams of appropriate sizes to suit the fingertips of totally blind or severe low vision children; simplify cluttered or superimposed diagrams without compromising accuracy and emphasize the most important areas, lines and points in tactile diagrams as well as avoid cluttering too much information and coding on one page, or this will confuse the children.

Attention should be given to classroom organization and management so as to provide optimum learning. The classroom should be big enough to allow the children safe mobility. The children should be provided with large desktops for their bulky textbooks and equipment so that they can have a comfortable work area. Since natural light is the best source of illumination, low vision children will benefit from sitting by the window or the Whiteboard.

Although better illumination often improves the perception of low vision children, direct sunlight should be avoided. Venetian blinds can be installed to address the problem. In gloomy days or other adverse illumination situations, intensive lights with background lighting of diffused fluorescent lights can be installed in the classroom especially for low vision children who use ink-print books. As far as possible, the surface of furniture or walls should best be in matt finish to avoid unnecessary glare. In order to facilitate the use of intensive lighting, audio and visual equipment, adequate electric power points should be installed safely in appropriate places. The classroom should be equipped with adequate notice-boards for display of learning materials, timetables, schedules, educational posters, children's work, etc. both in print and in Braille. Materials and equipment kept in a particular classroom or special room should be clearly labeled in large print or in Braille to give the children easy access. Should the teacher find it necessary to move the furniture in the classroom, all children should be informed beforehand.

The teacher should take special safety precautions when conducting outdoor activities, sports and games. The activities should be conducted in spacious ground. Places with fixtures, objects or wall-blocks that can be of danger to the children should be avoided. Anything lying disused on the floor should be cleared so that the children will not fall over them. Children with history of dislocated lens, detached retina and high myopia should not be allowed to carry heavy loads or take part in vigorous activities. Children with albinism should not be asked to stand for too long uncovered under strong sunlight. They can wear tinted glasses to reduce the discomfort caused by the glaring sun. Children who require spectacles should wear plastic glasses. Similarly the appropriate methods and facilities to be adopted for Totally Blind and Severe Low Vision Children and Mild and Moderate Low Vision Children These teaching and learning process are integrated with technological equipments. We are going to view the technological equipments which is used are discussed further.

### *D. Aids used for Visual Impairment's learning*

The visual impairment students are encouraged to use the different aids and equipments in their learning system to make them to gain the same information and knowledge as a normal learners In general they are advised to use the

Visual Aids, Tactile Aids and Auditory Aids Equipments.

For the learning process, in general Closed circuit television used to enlarge images on a television screen with variable sizes, contrasts and illumination. For Lighting they are using lamps to provide the amount and angle of light required for maximum reading efficiency. Textbooks and instructional materials learning materials to be presented in large print. The Book-stand or raised desk-top to bring printed materials closer to the children's eyes for better lighting and easy reading. spectacles, contact lens, telescopes and magnifiers, which are important low vision aids and should best be prescribed by qualified professionals.

Optacon an electronic reading device which transforms ink-print characters in books with an electronic lens into vibrating shapes that can be read tactilely with a single finger. In a braille writing and reading device which can store braille written information on audio cassette tapes, floppy disks or computer chips and can be retrieved later to be read on a braille display or in synthetic speech output, e.g. VersaBraille, Eureka/ Braillemate, etc. Slates and stylus : writing slates made either in a plastic or metal frame with openings through which braille dots are punched with a pointed stylus. Thermoform duplicators duplicating machines for mass-producing plastic braille pages and raised pictures for braille users.Print access reading systems for totally blind and severe low vision children :the Kurzweil Reading Machine, OSCAR or Arkenstone Reading Systems using computer scanning technology to convert print into synthetic speech output. Audio tapes and recorders useful for taking notes, recording homework, listening to assignments, etc.Talking calculators, clocks, electronic dictionaries, etc. aids available with synthetic speech output.

### *E. Modern Technology Aids*

## V. Categories of Software

The technology growth leads and provided many ways to the SNE learners. The modern computer aided system is encouraged and has provided many easy learning methods. Microcomputers, operated with appropriate special software and computer adaptive devices, make it possible for visually impaired children to have equal access to electronic data like their sighted peers. Besides learning the computer as a subject in special schools, visually impaired children can use the computer to assist them in learning other academic subjects and as an aid to communication with sighted children. The different software and its nature of the process towards the SNE is discussed below.

1. Reinforcement (Drill & Practice Software)
2. Interactive Books (Talking Stories)
3. Content-free Software
4. Exploratory Software
5. Reference Software
6. Study Skills Software
7. Assessment Software
8. Access Tools/Software

1. Reinforcement (Drill and Practice) Software is used to reinforce basic skills through repetition and practice. This type of software covers many SNE curriculum areas but special needs teachers most commonly use it to develop and reinforce basic reading and mathematical skills.

2. Interactive Books (Talking Stories) are electronic books which bring stories to life and cater for a range of levels (non-readers to older students with reading difficulties).Common features include:

3. Content-free Software allows teachers and students to enter their own content (e.g., text and graphics) and is used to enhance learning in many different areas of the curriculum.

4. Exploratory Software puts students in real life settings using a combination of graphics, videos, soundtracks and digitized speech. Simulations require the user to face challenges, make decisions, and solve problems in order to overcome obstacles.

5. Reference Software is designed to present a wide range of information in a multimedia format (text, audio, graphics, video sequences and animation). This type of software includes encyclopedias and atlases as well as subject specific information (e.g. volcanoes, anatomy).

6. Study Skills Software assists students in developing the necessary skills needed for efficient study. Topics often covered include note taking, essay writing, exam revision, memory techniques and time management.

7. Assessment Software is used to assess student attainment and identify learning difficulties. This type of software consists of a variety of tests to identify student's strengths and weaknesses.

8. Access Tools/Software are most commonly used by students with physical disabilities or sensory impairments. These tools may be required to complement a range of peripherals, but some of them can also be used on their own. Access tools are neither content-based, nor subject specific. They are used as an additional tool working alongside standard software. Examples of software tools include:

As per the analysis the study is focused to these levels of challenges such as Hearing Impairment ,Visual Impairment , Physical Handicap ,Mental Handicap ,Maladjustment and Learning Difficulties and use the appropriate technology such as aids and software for the learns objectives .

## VI. Associational Mapping

The technological and the learners information are associated one with another. The mapping process facilities to adopt and construct the learning environment to the users.The available virtual environment, web 3.0 , dynamic documents publication processor expected to adopt for the association mapping process. The association mapping process are load the variable values from the cubical data set.

The learner profile and the learning objectives is the first level data represented into two dimensional data base. These learners are expected to have one or more learning challenges. These challenges and its attributes are used to set up as a learning environment. These learning environment is to adopt the equipments and sp ecialized software to the learners according to the learning objectives. This mapping process is set up the learning environment.

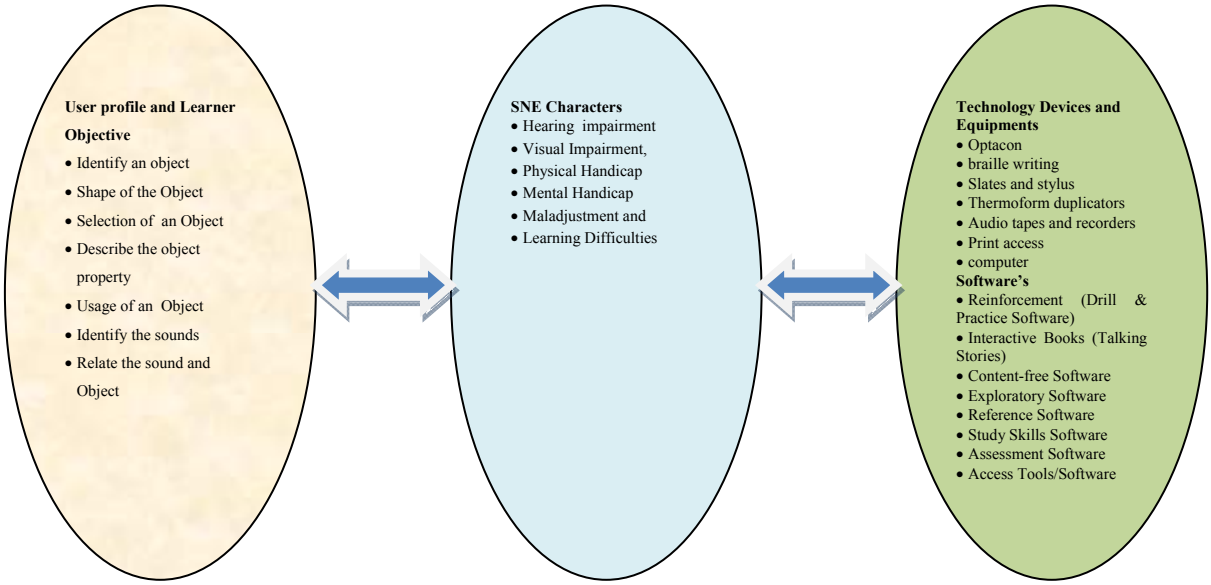


Fig.1. Association mapping

## VII. Construction of the Cubical Data Base

The learning system supports to the single or more learning challengers to provide continues learning process and observe their leaning level and design the automotive objective and complexity level with the following dimensions.

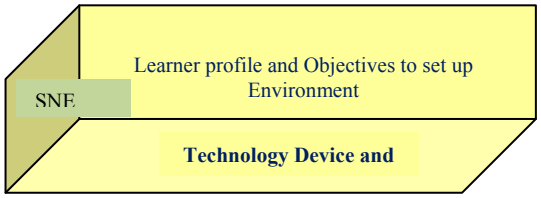


Fig .2. Cubical database model

This model focuses learner environment, challenges and the technological device and software which to be used. This system aimed based on the event driven architecture model to develop and maintain the cubical data base system.

It represents the details about the learner individual or multiple challenges and its level. According to the level of the environment attributes to are fixed. For this model no visual function, moderate low vision group ,low vision group three level is maintained. In each level the attributes are fixed according to the the learner objective and the devices to be adopted.

This proposed cubical database system had the following benefits

- To provide the sophisticated learning environment to the SNE learners according to their challenges
- To provide unique environment to the different users using same set up via set and loading environments setup
- Learning objectives can be dynamic according to the level of disabilities
- Feel the comfortable environment and increase the learning process
- Adopt the suitable technological device to the learners
- The analysis of the intellectual growth is easy

These cubical database can be integrated with the administration and the medical analysis system to the challengers and provide the better skill learning process.

## VIII. Conclusion

The learning factors are decided on the database which is required to adopt and implement the computer aided tools. In the computer aided special need educational system, learning objectives are same but the execution, methodology and adaptation of the tool differ one with another based on the challenges. The above mentioned Hearing Impairment, Visual Impairment, Physical Handicap, Mental Handicap, Maladjustment and Learning Difficulties challenges are managed with the help computer aided technology.

The teaching learning objectives, challenges and the modern methodology or pedagogy are represented in a cubical manner and build the knowledge base for effective teaching learning process of special need Educational system .The learning process integrated with intellectual, communicative , social and moral , personal and physical and Aesthetic Development. The special and learning difficulties can be solved through design the cubical database model.

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