EFFECTS OF MODELLING ON THE TEACHING OF PRE-PRIMARY CHILDREN WITH VISUAL IMPAIRMENT

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Abstract

Model is not the real world but merely a human construct to help the students better understand real world systems. In general all models have an information input, an information processor and an output of expected results. Tangible object such as beans, matchsticks, box, tube, ring, carton, fingers, abacus, cubarithm board, tactile objects, need for Improvisation, Wealth from Waste, Geo-Board, Construction activities and adaptation of aids could be served as model that will help children with visual impairment to cultivate interest in arithmetic. In the developed countries various programmes exist for special needs children, such programmes are usually deigned on a number as the basis for pre-school education. This includes Normal developmental model, cognitive model, behavioral model and eclectic model. This paper discusses on the effect of cognitive model for pre-primary pupils with visual impairment in teaching mathematics.

Introduction

Cognitive model: entail the combination of the principles of psychology and other related areas in carrying or improving the potential ability of the child with special needs especially visually impaired. In this model normal development is viewed in sequential normal and hierarchical stages assuming little or no variation for all children irrespective of their condition except mental retardation or severe and profound neurological conditions. However, it is conceived that the rate of development in infants differs from one child to another but, that it could be much slower for children at-risk. As such, emphasis is laid on sensory motor and cognitive development with less attention to social development (Weikart, Bonn and Meneil, 1978). Programmes based on this model for infants at-risk or pre-scholars are designed in a way that infants are assessed and diagnosed in terms of their capability and capacity to do things in relation to their rate of cognitive development.

Concept development may be the most critical cognitive factor for young visually impaired since. Such concepts will form the basis for all their future cognitive growth and activities. Capabilities of their intelligence are heavily concept based, and absence of concepts based issue can give a depressed view of a visually impaired child. Since the functions of intelligence are laid at the sensory motor stage up to the formal operational stage of the child life, it is essential that basic concept development must begin as early

as possible for visually impaired children, especially at the pre-operational stage, where the child has come to the age of two or above.

Cognitive factors such as classification, conservation and seriating are major factor for consideration. Nevertheless, one to one correspondence, are also based on adequate concept developmental factor. A visual impairment places a child in a situation in which it is difficult to cultivate interest in arithmetic Champman (1978), has stressed the need for a visually impaired child to explore and discover the characteristics of shapes through tactile investigations and to develop a vocabulary of meaningful through which to express the result of discoveries. The child should be encouraged to the use of tangible objects through pictorial representations; if he has some residual vision where he/she does not have a mode must be presented to the child.

Methods of acquiring number concepts by pre-primary school children with visual impairment.

Mathematics developed from counting, calculation, measurement and the systematic study of the shapes and motions of physical objects. It is a study of topics such as quantity, structure, space and change. It is the science of space, number, quantity and arrangement, whose methods involve logical reasoning and usually the use of symbolic notation and which includes geometry, arithmetic, algebra and analysis (Kneebone, 1963).

Pre-primary children with visual impairment need to be taught through modeling, finger math, mango, beans and or beads before using Abacus slate and stylus, perkins Brailler and Cubarithm board etc.

Charpman (1978) has however delineated ways of acquiring number concepts through:

a. Play activities leading to number work with materials that are manageable and distinctive in tactile terms as well as colorful for children with some vision.
b. Sets and number relationship begin to develop as soon as a child starts collecting things together and differently sorting according to their characteristics such sorting activities lead to an understanding of concepts of seriating and ordination;
c. Concepts concerning size, shape capacity and volume to be developed through games and activities that involve sorting and classifying agible objects according to criteria such as shape, size and texture before the use of symbolic representation.

Another acceptable method of teaching mathematics in preschool setting include finger Math, (Liberhal 1979), finger math, is a form of arithmetic computation which is performed with the fingers. It goes beyond simple counting on the fingers and permits additions, subtraction, manipulation and division of small or large number. Eltinger and Ogleree (1980) noted that, one possible advantage of using finger math to instruct blind children in mathematics is that, using the fingers may be more concrete and less abstract than using a manipulative device such as the abacus.

Effects of modelling in teaching pre-primary children with visual impairment in Mathematics

Modelling refers to a general process in which persons serve as models for others, exhibiting the behavior to be imitated by the others Vanden Boss, Gary (2006). But, in the case of children with visual impairment three-dimensional aids and the need and nature of improvisation of aids in the education of children with visual impairment, particularly in the area of mathematics are to be considered;

Tactile Tolerance

Since vision plays a predominant role in the assimilation of ideas by observation, certain aids which are commonly available for sighted children have to be adapted to suit the needs of visually impaired children. The concept of tactile attraction is to be emphasized in preparing teaching aids. Take for example, the Venn diagram explaining the concept of "intersection". In the diagram, the two sets A and B and the intersection A ∩B are presented in various colours. The same can be adapted to the use of visually impaired children by pasting sand papers of different coarseness to represent different areas. If this diagram is to be used by the student of higher standard who has acquired the ability to discriminate even the finest textures, the selection of the level of roughness is immaterial.

But on the other hand, for the child who is having limited skills in discriminating textures, various parts of teaching aids should have distinct differences in textures. Therefore, the texture selection also depends on the mental maturity of the visually impaired child who uses it.

Need for Improvisation

Improvisation is important for various reasons. Firstly, procuring sophisticated teaching aids demands resources. Secondly, the education of visually impaired children warrants more varieties and, as a result, a maximum number of teaching aids would be required. The teacher should know the techniques of using available resources which can provide maximum simulating experiences to the visually impaired child.

Wealth from Waste

In a normal school environment, many things which are usually treated as waste can effectively be used as teaching aids for visually impaired children because what they feel is more important than how the teaching aids look like.

For example, a waste chalk box can be used to explain the concept of a cubical; a rubber ball can be used for explaining the concept of a globe; different plastic balls can be used to explain the concept of volume; the chalk bits and stones can be used for counting; the Braille book itself can be used to explain the concept of rectangle/square; the waste cardboards can be used by the teacher to prepare cut-outs of triangles and

various geometrical figures and so on. Making wealth from waste depends on the creativity of the teacher.

Adaptation of Aids

As indicated in previous paragraphs, tactual attraction at every stage is more important and the teacher should verify that the child does not encounter any difficulty in understanding the concept. Geometrical devices can also be adapted to the needs of visually impaired children. Take for example, the protractor. The student is expected to measure the angles with the use of this equipment. In the normal protractor made out of plastic, big holes can be made for every ten degrees and small holes for every five degrees without breaking it. A small needle can be used to grave such tiny holes. It is however noted that minute information such as the dots for every unit cannot be made. If the teacher wants the graved points to have an embossed feeling, a drop of glue can be put in such holes which will give embossed feeling very distinctively. Similarly, many normal teaching aids can be improvised for the needs of visually impaired children. The main thrust of improvisation is to make adaptations more effective, to prepare many teaching aids with less cost and to provide varied teaching aids.

Teachers of visually impaired children with the guidance of experts in the subject (if needed) can adapt such teaching aids for the use of the visually impaired children without incurring much cost.

Three-dimensional Aids There is no doubt that three-dimensional aids would give concrete experiences to the visually impaired child in understanding a specific concept. On the other hand, certain models may not give the real experience to the child when he/she has not conceptualized it as a whole. For example, a small model of a multi-storeyed building or a big mountain may not provide the real experience to the child but the child can get an idea about those.

This knowledge acquisition depends upon the age of onset of blindness too. Naturally, blind children who have seen the objects before becoming blind can comprehend them in a better way. In mathematics, most of the teaching aids can be presented tactually because they are aiming at the development of certain concepts. Area, volume, height, weight, elevation, scale value, etc., are some concepts which can be effectively explained through three dimensional teaching aids. There are three-dimensional aids available from the market to teach the above ideas. But the teacher should assess the usability before procuring such aids.

The following principles are very important for the selection of three-dimensional teaching aids:

i. The three-dimensional teaching aid should be handy. It should not be too big to explore or too small to understand the minute differences.

ii. It should be strong and sturdy so as to withstand the manipulation of the visually impaired child.

iii. As far as possible, sharp edges should be avoided in three-dimensional aids for visually impaired children. Sharp edges may be made blunt to avoid injuries to the Braille reading fingers.
iv. If the teaching aids are of collapsible type, understanding will be better. For example concepts like hemisphere, diameter, circumference, radius, etc., can also be explained when the globe is of collapsible type.

The main purpose of the three dimensional aids is to make the children understand the two dimensional interpretations of them at a later stage. The teacher should check at every stage that the children acquire this skill effectively.

Geo-Board

The geo-board is a multi-purpose board. This can be used for showing geometrical figures and graphs. It is a peg board, square or rectangular in shape with nails at equal distance, both lengthwise and width wise. The distance between the nails can be determined according to the levels of the students. For example, the distance can be brought down even to one centimeter in the case of children of higher classes, whereas it should be at least one inch in the case of primary school children. This geo-board is a wonderful companion to the teacher of visually impaired children, especially in the teaching of mathematical concepts. Rubber bands can be used to show various shapes. When the distance between the nails is smaller, even circles can be shown. A Magnetic Board with magnetic strips and magnetic pieces pasted with braille symbols may also be useful for presenting learning materials in a spatial format.

Construction

Construction activities for visually impaired children are of two types. Firstly, making three-dimensional objects out of small pieces and secondly, construction of a two-dimensional tactile figure based on the given measurements. In the first case, small blocks can be used to construct three-dimensional figures. Cut-outs can be prepared and used for explaining certain concepts. For example, the Pythagorean Theorem can be explained very effectively with the use of cut-outs and the child himself can be oriented to measure the area of the squares on the base and the opposite side and compare their sum total with the area of the square of the hypotenuse. This develops the discovery skill of the visually impaired child. The circumference of a circle can be measured using a thread and the volume of the globe can be measured by filling it with water and so on. There are many activities which can be made more meaningful for the visually impaired child by a creative teacher.

The second type of construction is the tactual drawing of the diagram by the child. Even though this is complicated to some extent, there is no doubt that the visually impaired child can understand the procedures and draw figures if necessary equipments are provided.

Suppose the child is expected to draw a straight line, a tactile scale can be used and the child can draw the line with the use of wax or crayon pencils. The wax can be felt later to trace the line. A wax pencil instead of a normal pencil can be used in a normal compass to draw a circle. It is very essential that the child receives adequate training in these areas before he/she uses this equipment independently.

Relief papers are also used in schools for drawing diagrams in mathematics. The relief papers which provide upward embossed impressions straightaway assist visually impaired children as well as the teacher to deal with geometry effectively. At each and every stage of the construction of the diagram, the child will be able to assimilate ideas. When relief papers are not available, the tracing wheel can be used to draw the embossed diagrams.Since this type provides downward impression, the entire diagram has to be mirrored while drawing. (Mani, Plernchaivanich, Ramesh & Campbell, 2005).

Finally, there is need to summarize the effects of model in teaching children with visual impairment, this is to be considered as follows;

- Models can be constructed from scrap materials and if a thermo form machine is available, tactual diagrams can be quickly produced for group and for individual activities.
- A child may well be introduced to simple counting in which the child will counts from simple numbers up to the complex one or up to a hundred, but may not have fully conceptualized “fiveness” “seventeeness” in the absence of direct tangible objects to handle.
- Models assist the child’s conceptual development e.g. building blocks, rods of varying lengths sizes and colours etc.
- Logically models make children with visual impairment to think mathematically and how to record symbols on any types of apparatus used in arithmetic’s computation

Conclusion

As the paper implies, modelling may be used to promote cognitive development of children with visual impairment and acquire more complex academic subject such as mathematics and become more effective in understanding the shape, size of an object by developing tactile skills, as well as counting from simple digit up to complex once. As it was canvass in the paper using finger math or concrete object such as mango, bead and beans may be useful in teaching pre-school children with visual impairment. The above principles highlight the importance of teaching aids which can make the learning of mathematics more interesting to the visually impaired child. Even with all available resources, a teacher who is less creative may not derive maximum benefit for visually impaired children from the teaching aids. Therefore, it is vital that the teacher tries to be more creative so that he can bring utmost variety to the education of the child.

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