

Pictorial Learning and Visual Imagery–Based Activity Methods in Nutrition Education for Primary Schoolchildren in India

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INTRODUCTION

Malnutrition has a significant bearing on the progress of any country.¹ Childhood is a crucial formative stage in the life cycle of an individual. Malnutrition during this phase of life could even result in the onset of degenerative diseases in a later part of life.^{2,3} Nutrition education is a key element in promoting sustainable healthy eating behaviors and should start from early stages of life. The importance of learning nutrition-related knowledge early for future health is widely recognized.⁴ Schools provide a great platform to reach out to children during their formative years. School-based interventional programs not only increase knowledge about nutrition and health but also lead to significant changes in food choices.^{5,6} However, developing education material that interests young children and communicates nutrition messages is a continuous and demanding process. Dale's Cone of Experience Model suggests that information retention is higher where hearing, reading, observing, and doing are employed.^{7,8} Visual literacy is the active process of reading, interpreting, and understanding images and visual media.⁹ This can have a major

role in promoting better understanding of any subject including nutrition. In school settings, visuals can help teachers become creative managers of learning experiences rather than merely dispensers of information.¹⁰ The current study focused on developing a visual teaching aid called a pictorial quiz ([Supplementary Materials 1](#)) to promote activity-based learning to enhance attention and retention of nutrition knowledge pertaining to functions of foods and concepts of a healthy lifestyle among primary schoolchildren. This was tested among schoolchildren belonging to 2 different economic strata.

DEVELOPMENT AND IMPLEMENTATION

The first step in developing pictorial learning activities was a review of earlier studies that assessed nutrition content in school science curricula and textbooks of primary grades 3–5.¹¹ Based on this, topics such as identification of foods, health benefits and functions of foods, healthy/unhealthy foods, and healthy/unhealthy lifestyles were identified for inclusion. In the second stage, an item pool of 48 activity-

based pictorial questions was prepared. Three experts from nutrition extension, education/communication, and psychology reviewed the item pool. As per the suggestions of the experts, some questions were modified, rephrased, or deleted because they were repetitive or because the pictures were of uncommon foods that were considered difficult to comprehend for primary schoolchildren. The pictorial quiz thus prepared had 40 items with 4 different tasks: Task 1: Identifying fruits and vegetables and matching them with their names (5 fruits and 5 vegetables); Task 2: Fill in the blanks with right answer (10 questions on nutrition, health, and hygiene); Task 3: Identify the foods and say how they help our body (12 questions on cereals and millets, legumes and pulses, and vegetables); and Task 4: Differentiating healthy/unhealthy foods and lifestyles (8 pictures including eating sprouts or fruits, drinking soft drinks, or eating burgers; playing video games/mobile games; exercising; sunlight; vitamin D; and viewing television).

Quiz questions were then pretested with 40 children (aged 7–12 years) randomly drawn from 2 schools. Pretest results prompted few modifications in questions and were mostly related to replacing the line drawings with color pictures of foods.

In addition, a set of 3 charts (2.5 × 4 ft) ([Supplementary Materials 2](#)) was prepared based on the identified topics. Along with the images, the charts included samples of cereals, millets, and pulses in transparent pouches and sachets for the children to see, feel, and remember.

Implementation

Participants (n = 304) drawn from a government-run school (catering to low-income children) and a corporate

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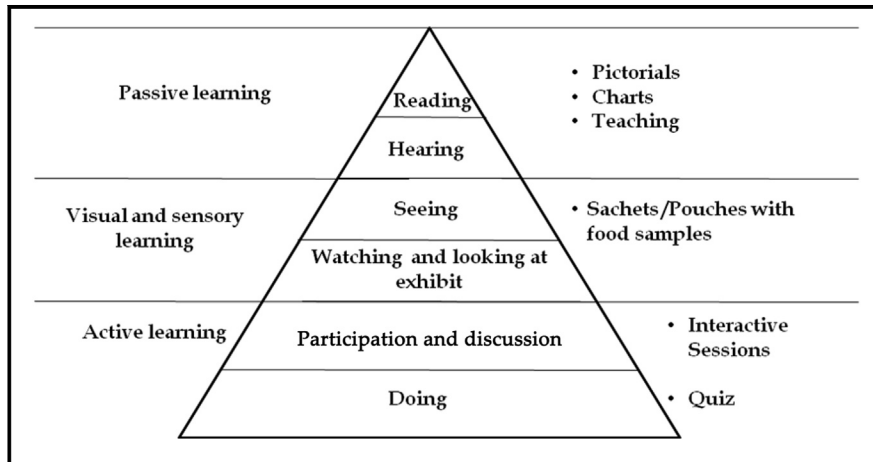


Figure 1. Principles of Dale's Cone of Learning used in development of pictorial quiz to promote activity-based nutrition learning among primary schoolchildren.

school (catering to middle-income children) from the south Indian city of Hyderabad received nutrition education intervention using this material.

As per the research of Dale⁷ and Anderson,⁸ the effective methods of learning and retention are at the bottom of the cone and involve visual, observational, and purposeful learning experiences through sensory channels and activity-based approaches. Informed by this, with the help of the respective teachers, the investigators imparted nutrition education to the children in the classroom settings. The intervention, which was carried out for 25 days, consisted of 10 interactive sessions, each of 15–20 minutes duration, using pictorial charts (visual method). At the end of each session the children answered topic-specific questions from the 40-item pictorial quiz (activity-based approach). In addition, the charts and sample sachets/pouches were kept on display (for visual and sensory learning) in their classrooms for 15 more days. The school teachers were asked to draw children's attention to these posters and discuss the contents of the charts at least once a day for continuous reinforcement of visual imagery (Figure 1).

Evaluation

Participants' nutrition knowledge was measured before and after the intervention to assess the impact of the exposure. As per the recommendations of the Institutional Ethical Committee of National Institute of Nutrition (Indian

Council of Medical Research), Hyderabad, the researchers obtained permission from the school authorities. Written informed consent forms were sent to parents of 330 children (160 from government schools and 164 from corporate schools), aged 7–12 years, grades 3–5. Of those parents, 323 consented for their children's participation, 1 refused, and 6 did not return the forms. After calculating loss to follow-up, 304 participated in all phases of the study.

Knowledge at baseline was assessed using a pictorial questionnaire with random questions from the 40-item pool prepared for nutrition education. Each child individually answered the questionnaire (without interacting with other children and the teachers) in classroom settings as an investigator

read the questions aloud. Each correct answer was assigned a score of 1; a wrong answer was assigned 0 for analysis. The maximum possible score was 40. The final data were collected 10 days after the second intervention using the same questionnaire that was used during the preintervention phase. Descriptive statistics and 2-sample *t* test were used to assess differences in knowledge scores before and after the intervention. ANCOVA was used to compare mean percent positive responses. The statistical software used was SPSS, version 19 (IBM Corporation, Armonk, NY; 2009).

Mean age of participants (\pm SD) was 9.6 ± 1.4 years. The educational intervention led to a significant ($P < .001$) improvement in knowledge scores of the participants. The mean score of total participants (\pm SD) improved from 19.78 ± 3.79 to 32.16 ± 2.26 after the intervention (Figure 2). Initial knowledge on the functions of foods and nutrients present in them was as low as 0% to 4% in both of the schools; this improved to 84% to 98%. Knowledge scores also increased for cereals, millets, and pulses after the intervention (Table 1). Questions were grouped into 5 categories (fruits, vegetables, cereals, pulses, and general). Scores related to knowledge on fruits were lower among government schoolchildren and high among children of corporate schools. Therefore, improvement in the positive responses was noticed more significantly among the government schoolchildren. The reason for lower scores among government schoolchildren at

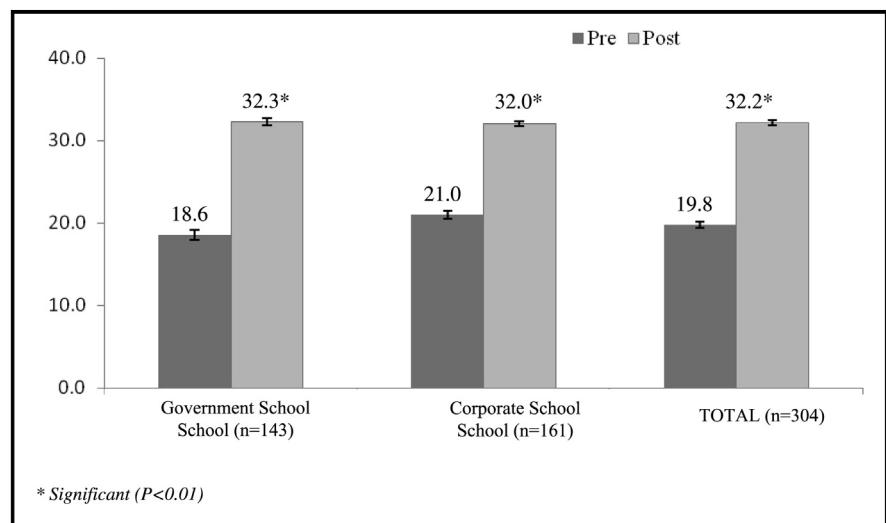


Figure 2. Mean (\pm SD) scores of primary schoolchildren before and after nutrition education intervention.

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