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Effect of Teaching Modules in Knowledge Gain of Students

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Authors' contributions

This work was carried out in collaboration between all authors. Author AK wrote the first draft of the paper, designed the data with the help of author USH, collected the data and performed the statistical analysis. Author USH helped to make the first draft of the paper, managed the analysis of the study and guided the author AK in all the steps of the paper writing. Author PKC helped in writing section and editing in English language. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To know the knowledge level of students about nutrition and health and gain in knowledge after introducing teaching modules to the selected groups.

Study Design: Random sampling design method was used in this study

Place and Duration of Study: A total of 300 rural junior college students from both Dharwad and Pithoragarh taluks (150 from each taluk) were selected for the study. The study was carried out between November 2016 and May 2017.

Methodology: The study was carried out with the sample size of 300 rural junior college students. In this study three groups were taken, one control group in which lecture + discussion method were used to collect the data. Other two groups were experiment groups i.e., treated group-1 in which

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lecture + PPT+ discussion and treated group-2 where lecture + video clipping+ discussion were used to gather the information from the respondents.

Results: The data revealed that treated group-2 gained more effectively, than other two groups showing increase in the knowledge of the students regarding nutrients and health in both Dharwad (Karnataka state) and Pithoragarh (Uttarakhand state) taluks. Results have indicated that, in Dharwad taluk, amongst all the variables, study habits and mother's education showed highly significant relationship whereas, in Pithoragarh taluk, size of the family was observed as having significant relationship with the knowledge of the students about nutrition and health.

Conclusion: Knowledge of facts alone does not constitute understanding. It is only the first step. Understanding is attained only when one is able to attach meaning to facts, see the relationship of facts to each other and to the whole of a proposition and the relationship of the total body of facts to the problem under consideration. Hence, the development of nutrition education programs for youth is essential for increasing their ability to understand proper food practices, encouraging these individuals to become active in a social transformation process by spreading these healthy food habits and contributing to the establishment of a society with better future perspectives.

Keywords: Effectiveness; nutrition; modules; students.

1. INTRODUCTION

In rural India, education is an effective tool for community development and thereby bringing social changes. Education is important for all and especially for adolescents as it plays a vital role in psychosocial, intellectual and vocational well being. Teachers, curricula, school activities and culture, all provide basic raw material contributing to the adolescent's sense of oneself and also increasing their knowledge base and skill.

Further, nutrition also plays a great role in our daily life as good nutrition is essential for good health. Eating a variety of foods supply us with the necessary nutrients that are essential for our body. By taking care in choosing the foods that are seasonal and locally available, eating can be enjoyable, healthy and affordable. In order to stay healthy, safe and free from disease, it is important that we follow a good nutritious diet.

Nutritious food is a key elements in maintaining our physical well being. We must always pay attention to foods that we eat because they will eventually impact the health, for better or worse. Food is essential for our body to develop, replace and repair cells and tissues, produce energy to keep warm, move and work, carry out chemical processes such as digestion of food, protect against, resist and fight infection and recover from sickness. Food is made up of nutrients which provide our body with the energy, protein, essential fats, vitamin and minerals to live, grow and function properly. The body cannot function properly if one or more nutrients are missing.

For the well being of rural community, education regarding nutrition and health is the necessary ingredient, as it is designed to facilitate voluntary adoption of food choices and other food and nutrition related behaviors conducive to health and well-being.

Nutrition education can be delivered through multiple channels and involving activities at the level of individual, community and policy. For providing such information to the students in a proper manner, different teaching methods should be used by the teachers to enhance their learning outcome.

In the past, teaching methods were considered as a rigid, formal and stereotype process of just transmitting knowledge. Education was thought of as a bipolar process with teachers at the giving end and students at the receiving end. Teachers were considered to be the only source of knowledge although in the later stages manuscripts or printed materials were also used. This new era has made the educationists to realize that in education 'learning' is now important than 'teaching'. The former is concerned with both pupils and teachers. The traditional concept of teacher as the only source of knowledge has now gone undergone a change due to the advancement in science and technology [2].

In a scientific study conducted on learning methods in USA, it has been generalized that people learn by hearing (20%), by seeing (30%), by hearing + seeing (50%), by doing (70%) and when they do again and again (90%). Teaching along with lecture method in combination with

suitable teaching aids by making different teaching modules helps to arouse interest in learning, increase the knowledge level of the students by active participation [6].

Teaching aids are the tools used by the teachers to teach the students for improvement in their reading and other skills, illustrate the facts and ideas. There are different types of teaching aids used by the teachers in which audio visual aids are more effective for students learning. It includes presentation, video clipping etc.

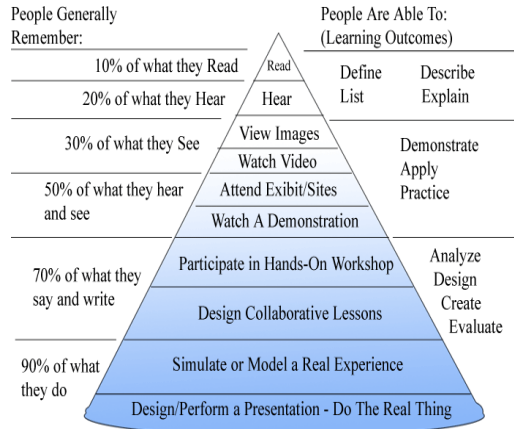
Instructional methods are the basic approach by which the instructor has transferred the knowledge to the students. The preparation of instructional methods depend on the students age, developmental level, previous knowledge, their needs, subject-matter content, objective of the lesson, available people, space and material resources and physical set up of the classroom.

Reiser and Dempsey [8] define instructional methods as "the elements included in instruction for the purpose of supporting the achievement of the learning objective". The instructional methods allow learners to draw upon cognitive process of learning through assisting learners in paying attention to relevant materials, mentally organizing it into a coherent representation and mentally relating it to prior knowledge. Instructional method includes practice, problems or exercises, negative or positive feedback, visuals, educational games and simulations [8].

Teaching methods are the devices used to create situations in which communication can take place between the instructor and learner. Though there are different teaching methods like group discussion, brain storming, case study, role play etc. teachers mainly use lecture method to teach the students as it is an excellent traditional method for giving information in short period of time. To make the teaching more effective, teaching should be based on fundamental principles that students learn by seeing with their own eyes, by hearing with their ears, by saying with their mouth and by doing with their own hands. According to Chinese proverb "If I hear, I forget; If I see, I remember; but If I do, I learn".

Edgar Dale [4] describe the 'Cone of Experience' which is a visual device meant to summarize Dale's classification system for the varied types of mediated learning experiences. The organizing principle of the 'Cone' was a

progression from most concrete experiences (at the bottom of the cone) to most abstract (at the top) [4].



Dale's Cone of Experience

The traditional classroom with one teacher, teaching students were mainly one way of communication is no longer effective in modern times due to dynamic nature of society. The change should be brought in teaching learning situation. So there is a need to introduce modern teaching learning process [3].

2. MATERIALS AND METHODS

The present study was conducted during the year 2016-2017 in Dharwad taluk (Karnataka state) and Pithoragarh taluk (Uttarakhand state). Three villages from Dharwad taluk viz. Garag, Alnavar and Navalur and three villages from Pithoragarh taluk viz. Tootanaula, Gaurihaat and Bin were randomly selected. Purposive random sampling method was used to select 300 respondents, 150 from each taluk and 50 from each village to know the effectiveness of nutrition teaching modules on students in pre and post test.

The district of Dharwad along with its surrounding areas hold approximately 400 schools including primary, middle and higher levels of education. Precisely in the city range of Dharwad 146 schools are located and others are in the rural areas of Dharwad. As per 2012 status, there are total 2004 schools in Pithoragarh district. These include 1910 rural schools and 94 urban schools. When it comes to total number of school by type, Pithoragarh has about 1975 co-educational schools, 10 boys' schools and 19 girls' schools.

The college authority readily accepted the proposal to conduct the intervention and was ready to co-operate. Thus, looking to the convenience and familiarity of the researcher as well along with the demand of the college it was decided to conduct the study.

Three government PU college of Dharwad taluk and three Government Inter College of Pithoragarh taluk were selected for the study. The study was carried out on selected 1st and 2nd PU standard students based on their regularity in the class. Students including both boys and girls were selected from each college (50 from each village) making a total sample of 300. Pre test was conducted by the researcher itself to know the knowledge level of the respondents. After pre test, post test was conducted to know the gain in knowledge after giving intervention by using different modules prepared by the researcher. Frequency, percentage, mean and paired't' value were used as a statistical tools to analyze the data.

Three groups were selected from each district for the study where in, two groups for education intervention each with one teaching module and another as controlled group. To know the effectiveness of developed teaching modules in terms of knowledge gain, questions were prepared on nutrient and health. Pre- testing was done in a non- study area to locate the ambiguity in the questions. After pre testing, certain modifications were made in the questionnaire by consulting the specialists.

- In the questionnaire, first part consists of general information of the respondents and their parents. Second part was to study the effectiveness of developed teaching modules in terms of knowledge gain about the nutrition and health. Multiple choice questions were framed to tick the correct answer from given choices.
- Questionnaire for knowledge test was developed with the help of specialists was developed to know the effectiveness of teaching modules in terms of knowledge gain of the students, 16 questions on nutrients and health were selected. They were presented to the respondents with 'Multiple Choice' type of questions. A score of two was given to the right answer and one was assigned to the wrong answer. The possible obtainable score range between 16 and 32 in nutrition and

health for each student. Based on the total scores, the respondents were classified into low, medium and high categories. Procedure followed by Dalavi (2010).

Selected topics of nutrition and health were delivered through lecture followed by discussion to controlled group. Teaching module 1: Lecture + PPT + Discussion and module 2: Lecture + Video clipping + Discussion, were prepared for treated groups on selected topics in the local language Kannada for Karnataka state and Hindi for Uttarakhand state. Finalized questionnaire was used for data collection. Data as collected by the researcher itself.

Immediately after the intervention, post test was conducted for all the three groups (controlled and treated group) through the same questionnaire used for pre testing the knowledge level of students.

3. RESULTS AND DISCUSSION

3.1 Knowledge Level of Students about Nutrition and Health

The results of knowledge level of students about nutrition and health in both Dharwad and Pithoragarh taluks indicated that knowledge of the treated group-2 *i.e.*, Module-2: Lecture + Video clipping + Discussion was found to be highest (Tables 1 and 2).

Regarding knowledge level of respondents in Dharwad taluk of treated group-1 and treated group-2 about nutrition and health is presented in Table 1. In pre test, 66.00 per cent of the respondents belonged to medium level of knowledge in treated group-1 and 74.00 per cent in treated group-2 followed by low level *i.e.*, 34.00 per cent and 26.00 per cent respectively.

After post test, majority of the respondents from both treated group-1 and treated group-2 belonged to medium level of knowledge, the change was found to be from 66.00 per cent to 98.00 per cent in treated group-1 and 74.00 per cent to 88.00 per cent in treated group-2. Second increase in knowledge was observed in high level *i.e.*, 0.00 per cent to 2.00 per cent in treated group-1 and 0.00 per cent to 12.00 per cent in treated group-2 regarding nutrition and health (Table 1).

Table 1. Knowledge level of respondents about nutrition and health in Dharwad taluk

(n=150)

Groups	Knowledge level					
	Pre test			Post test		
	Low (0-12)	Medium (13-25)	High (26-37)	Low (0-12)	Medium (13-25)	High (26-37)
Controlled group-50 (Lecture + Discussion)	8 (16.00)	42 (84.00)	-	-	50 (100.00)	-
Treated group-1 (50) (Module-1:Lecture + PPT + Discussion)	17 (34.00)	33 (66.00)	-	-	49 (98.00)	1 (2.00)
Overall	25 (25.00)	75 (75.00)	-	-	99 (99.00)	1 (1.00)
Controlled group-50 (Lecture + Discussion)	8 (16.00)	42 (84.00)	-	-	50 (100.00)	-
Treated group-2 (50) (Module-2: Lecture +Video clipping + Discussion)	13 (26.00)	37 (74.00)	-	-	44 (88.00)	6 (12.00)
Overall	21 (21.00)	79 (79.00)	-	-	94 (94.00)	6 (6.00)
Treated group-1 (50) (Module-1:Lecture + PPT + Discussion)	17 (34.00)	33 (66.00)	-	-	49 (98.00)	1 (2.00)
Treated group-2 (50) (Module-2: Lecture +Video clipping + Discussion)	13 (26.00)	37 (74.00)	-	-	44 (88.00)	6 (12.00)
Overall	30 (30.00)	70 (70.00)	-	-	93 (93.00)	7 (7.00)

Values in parenthesis indicate percentage

Table 2. Knowledge level of respondents about nutrition and health in Pithoragarh taluk

(n=150)

Groups	Knowledge level					
	Pre test			Post test		
	Low (0-12)	Medium (13-25)	High (26-37)	Low (0-12)	Medium (13-25)	High (26-37)
Controlled group-50 (Lecture + Discussion)	12 (24.00)	38.00 (76.00)	-	1 (2.00)	47 (94.00)	2 (4.00)
Treated group-1 (50) (Module-1: Lecture + PPT + Discussion)	5 (10.00)	45 (90.00)	-	-	27 (54.00)	23 (46.00)
Overall	17 (17.00)	83 (83.00)	-	1 (2.00)	74 (74.00)	25 (25.00)
Controlled group-50 (Lecture + Discussion)	12 (24.00)	38.00 (76.00)	-	1 (2.00)	47 (94.00)	2 (4.00)
Treated group-2 (50) (Module-2: Lecture +Video clipping + Discussion)	8 (16.00)	42 (84.00)	-	-	8 (16.00)	42 (84.00)
Overall	20 (20.00)	80 (80.00)	-	1 (2.00)	55 (55.00)	46 (46.00)
Treated group-1 (50) (Module-1: Lecture + PPT + Discussion)	5 (10.00)	45 (90.00)	-	-	27 (54.00)	23 (46.00)
Treated group-2 (50) (Module-2: Lecture +Video clipping + Discussion)	8 (16.00)	42 (84.00)	-	-	8 (16.00)	42 (84.00)
Overall	13 (13.00)	87 (87.00)	-	-	35 (35.00)	65 (65.00)

Values in parenthesis indicate percentage

Overall knowledge level of the respondents of treated group-1 and treated group-2 showed that, in pre test 70.00 per cent of them had medium level of knowledge followed by low level (30.00%). In post test, more than ninety per cent of the respondents had medium level (93.00%) of overall knowledge followed by high level (7.00%). Overall knowledge level was considerably increased from 70.00 per cent to 93.00 per cent in medium level and 0.00 per cent to 7.00 per cent in high level of knowledge (Table 1).

In Pithoragarh taluk, regarding knowledge level of respondents of treated group-1 and treated group-2 about nutrition and health is presented in Table 2. In pre test, ninety per cent of the respondents belonged to medium level of knowledge in treated group-1 followed by low level of knowledge (10.00%). In case of treated group-2, more than eighty per cent of the respondents belonged to medium level (84.00%) of knowledge followed by low level (16.00%). None of the respondents from both treated group-1 and treated group-2 belonged to high level of knowledge regarding nutrition and health.

After post test, though, majority of the respondents in treated group-1 belonged to the same medium level (54.00%) of knowledge followed by high level (46.00%). No student was found in high level of knowledge in pre test but after post test, increase in knowledge level about nutrition and health was observed to be 46.00 per cent (treated group-1). In treated group-2, 84.00 per cent of the respondents belonged to high level of knowledge followed by medium level (16.00%).

Overall knowledge level of respondents of treated group-1 and treated group-2 showed that, in pre test 87.00 per cent of respondents had medium level of knowledge followed by low level (13.00%) but, in case of post test, 65.00 per cent of the respondents had high level of overall knowledge followed by medium level (35.00%) of knowledge regarding nutrition and health. Overall knowledge level was observed to be increased from 57.00 per cent to 76.00 per cent in medium level and from 0.00 per cent to 65.00 per cent in high level of knowledge regarding nutrition and health (Table 2).

These findings shows that intervention by using pictures, depicting locally available resources in local languages Kannada and Hindi with background music helped to increase the interest of the students by clear photographs, pay more

attention and give clear ideas. Possible reason might be that students understanding of facts, concepts and principles become effective when they are taught by innovative tools like overhead projector, computer, LCD etc. in a subject like biology, visual experiences are more effective than verbal experiences. Combination of sound and vision makes the class dramatic. Simulated laboratory experiences also can be one of the best media for teaching. [7]

From the nutritional point of view, adolescents are considered vulnerable individuals because of their current dietary pattern, which is typically low in micronutrients and high in sugars and fats. Currently, adolescent obesity is a universal disease with a growing global prevalence, assuming the epidemiological nature of a public health problem. The promotion of a healthy diet is one of the main public health strategies for facing these food and nutrition problems in the current context because they consist of a strategy capable of preventing nutritional deficiencies and of reducing the incidence of overweight and other Chronic Non-Communicable Diseases (NCD), such as obesity, diabetes, hypertension and cancer. It may change their attitude regarding eating habits for better health and keep away from diseases. Teaching through computers attracts the attention, creates interest among them and motivate them to learn. Combination of graphics, animation and text facilitates learning. [1]

3.2 Overall Effectiveness of Teaching Modules in Terms of Knowledge Gain about Nutrition and Health

Results of overall effectiveness of teaching modules on students showed that after post test, gain in knowledge of the treated group-2 (Module-2: Lecture + Video clipping + Discussion) was found to be highest in terms of index regarding nutrition and health in both Dharwad and Pithoragarh taluks *i.e.*, from 38.22 to 60.81 (knowledge gain of 22.59) and from 42.59 to 75.66 (knowledge gain of 33.07) respectively (Tables 3 and 4).

This clearly indicated that the intervention programme to treated group -2 with module-2 was found to be more effective in imparting knowledge to junior college students in both Dharwad and Pithoragarh taluk of Karnataka and Uttarakhand. In Pithoragarh taluk, effectiveness was more as compared to Dharwad taluk.

Reason for effectiveness might be due to the use of comfortable and appropriate facilities of audio-visual aids (smart board) for teaching with supportive aids. Audio visual aids are used to improve teaching, *i.e.*, to increase the concreteness, clarity and effectiveness of the ideas and skills being transferred. It provides standardized approach of presenting information to students and a teacher can teach quickly, systematically and clarify the doubts in an effective manner [5].

Electronic media-based interventions lend themselves to experiential learning and, when created according to established health promotion and instructional design principles, offer distinct advantages over conventional methods of health education. Because of their repetitive nature, these interventions can better expose individuals to educational content and reinforce learning. Furthermore, electronic media-based interventions can be personalized through the creation of avatars and virtual identities. Finally, these interventions have interactive capability that can provide immediate feedback and increase player engagement. Accordingly, they may be an ideal platform for improving health outcomes for adolescents. However, little research has been done on the efficacy of electronic media-based interventions,

especially on their effect on health or safety behavior.

Information and communication technology (ICT) provides a range of tools with a unique capacity to extend and enrich teachers' instructional strategies and students' learning in social studies. Information and communication technology can be used to connect students to other schools, at home and abroad and to bring the global community into the local classroom. The social studies classroom has been greatly influenced by the impact of technology integration. Students of social studies in the information age need to understand historical, social concepts and events in addition to developing critical thinking and the analysis of resources available through a variety of media. ICT integration in schools is needed in order to accomplish many objectives and improve the quality of lessons in all subject areas as well as social studies.

3.3 Relationship between Independent Variables and Knowledge about Nutrition and Health

Table 5 shows relationship of independent variables and knowledge about nutrition and health. In Dharwad taluk, amongst all the

Table 3. Overall effectiveness of teaching modules in terms of knowledge gain about nutrition and health in Dharwad taluk

Groups		Pre test Mean	Post test Mean	Pre test Index	Post test Index	Knowledge gain	Paired t- value
Dharwad	Controlled group-(50) (Lecture + Discussion)	14.62	17.02	39.51	46.00	6.49	8.198**
	Treated group-1 (50) (Module-1: Lecture + PPT + Discussion)	13.62	20.06	36.81	54.22	17.41	17.592**
Total		14.12	18.54	38.16	50.11	11.95	14.296**
	Controlled group-(50) (Lecture + Discussion)	14.62	17.02	39.51	46.00	6.49	8.198**
	Treated group-2 (50) (Module-2: Lecture + Video clipping + Discussion)	14.14	22.50	38.22	60.81	22.59	18.818**
Total		14.38	19.76	38.86	53.41	14.55	13.460**
	Treated group-1 (50) (Module-1: Lecture + PPT + Discussion)	13.62	20.06	36.81	54.22	17.41	17.592**
	Treated group-2 (50) (Module-2: Lecture + Video clipping + Discussion)	14.14	22.50	38.22	60.81	22.59	18.818**
Total		13.88	21.28	37.51	57.51	20.00	24.489**

** Significant at 0.01 level

Table 4. Overall effectiveness of teaching modules in terms of knowledge gain about nutrition and health in Pithoragarh taluk

		n=150					
Taluk	Groups	Pre test mean	Post test mean	Pre test index	Post test index	Knowledge gain	Paired t- value
Pithoragarh	Controlled group-(50) (Lecture + Discussion)	15.38	19.10	41.57	51.62	10.05	13.798**
	Treated group-1 (50) (Module-1: Lecture + PPT + Discussion)	17.30	24.56	46.76	66.38	19.62	19.386**
	Total	16.34	21.83	44.16	59.00	14.84	18.904**
	Controlled group-(50) (Lecture + Discussion)	15.38	19.10	41.57	51.62	10.05	13.798**
	Treated group-2 (50) (Module-2: Lecture + Video clipping + Discussion)	15.76	28.00	42.59	75.66	33.07	27.853**
	Total	15.57	23.55	42.08	63.65	21.57	15.989**
	Treated group-1 (50) (Module-1: Lecture + PPT + Discussion)	17.30	24.56	46.76	66.38	19.62	19.386**
	Treated group-2 (50) (Module-2: Lecture +Video clipping + Discussion)	15.76	28.00	42.59	75.66	33.07	27.853**
	Total	16.53	26.28	44.66	71.03	26.37	25.594**

** Significant at 0.01 level

Table 5. Relationship of independent variables with knowledge about nutrition and health

		n=300	
Sl. No.	Independent variables	'r' value	
		Dharwad (n1 = 150)	Pithoragarh (n2 = 150)
1.	Family size	0.074 ^{NS}	0.183*
2.	Academic performance	0.004 ^{NS}	-0.012 ^{NS}
3.	Study habit	0.314**	0.098 ^{NS}
4.	Father's education	0.057 ^{NS}	0.069 ^{NS}
5.	Father's occupation	-0.118 ^{NS}	0.019 ^{NS}
6.	Mother's education	0.215**	-0.075 ^{NS}
7.	Mother's occupation	-0.084 ^{NS}	-0.067 ^{NS}

* Significant at 0.05 level ** Significant at 0.01 level NS: Non-significant

variables, study habits and mother's education showed highly significant relationship with the knowledge of the students about nutrition and health. Education of mother helped the children to gain their knowledge as mothers gave more emphasis on their studies which improves their study habits.

In Pithoragarh taluk, relationship of independent variables and knowledge about nutrition and health was observed to be significant with regard to family size. Possible reason might be that if parents have fewer children, they gave more attention to their studies and thus, increase their knowledge in an effective manner.

Hence, effectiveness of teaching modules can be assessed through developed teaching aids. According to a Chinese proverb "One picture is equal to 1,000 words".

3.4 Scope of the Study

The impact of the research should not be short term but the teachers should retain the use of these teaching modules in different subjects. To arouse their interest, to give information in attractive way, to enhance and retain their knowledge for longer time, teachers should adopt such teaching methods with supporting audio-visual aids. The students are

expected to have an increased knowledge about nutrition and health after the intervention. Effectiveness of teaching modules can be assessed through developed teaching aids. The effective teaching module should be able to improve the knowledge level of the students for their healthy life.

3.5 Limitations of the Study

As the study was conducted by a student researcher who had limited time as other resources at her disposal, the study was confined to only three villages each of Dharwad (Karnataka state) and Pithoragarh (Uttarakhand state) taluks. Therefore, the findings of the present investigations have the limitation of wider generalization. In spite of these limitations every effort was made by the researcher to keep this study as objective as possible. Hence, the findings of the study would be applicable only to the regions where similar conditions exist.

4. CONCLUSION

Knowledge of facts alone does not constitute understanding. It is only the first step. Understanding is attained only when one is able to attach meaning to facts, see the relationship of facts to each other and to the whole of a proposition and the relationship of the total body of facts to the problem under consideration. Use of attractive and local language with background music showed more interest of students to listen and retain these things in mind properly [9].

Hence, the development of nutrition education programs for youth attending non-profit institutions is essential for increasing their ability to understand proper food practices, encouraging these individuals to become active in a social transformation process by spreading these healthy food habits and contributing to the establishment of a society with better future perspectives.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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