ENSEMBLE
A bi-lingual peer reviewed academic journal

ISSN 2582-0427 (Online)
Volume 2, Number 1
March, 2020
http://www.ensembledrms.in

https://doi.org/10.37948/ensemble-2020-0201-a009

Crossref

EFFECT OF EXPERIENTIAL LEARNING ON COGNITIVE SKILLS OF SECONDARY SCHOOL PVTG STUDENTS IN ASRAM SCHOOLS OF KERALA

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Article Ref. No.:
20021073N2EASR

Article History:
Submitted on 10 Feb 2020
Accepted on 12 Apr 2020
Published online on 19 Apr 2020

Keywords:
Culture responsive teaching, Dhebar Commision, Experience based learning, Primitive tribal group, Socially disadvantaged societal sections

Abstract:
The present-day education system is in accordance with the main needs of all human beings. Though the system caters to almost all the needs of an average section of the society, it needs some revamping and reconstruction while encountering with the socially disadvantaged sections of the society. The experiential learning module can be constructed and administered effectively to enhance cognitive skills. The module can be constructed according to Kolb's theory of experiential learning as prescribed by David. S. Kolb. The module strengthens the cognitive skills through the four different stages of experiential learning. The present study is employed on Class 8 PVTG students studying in Asram Schools of Kerala. The districts selected for the study were Palakkad and Malappuram. The study incorporated a sample size of 80 students including both boys and girls. The sampling strategy adopted was the purposive sampling technique. The total population of class 8 PVTG students studying in Asram schools of Kerala is 200. A tool to test the cognitive skills of the students was prepared by the researcher. It was standardized and validated for reliability, and the values were 0.732 and 0.563. The module was administered, and the pre-test and the post-test scores were calculated to find out the significant difference in the cognitive skills of the students. The result shows that the administration of Experiential Learning Module is effective in enhancing the cognitive skills of the secondary school PVTG students studying in Asram schools of Kerala

1.0. Introduction

The education system of a nation depends upon the culture and customs of the nation. A good education system is one which includes in it the moral values, culture, beliefs, and traditions of the society interlinked with the technological

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advancements of the nation and world. The students will be much more sustainable and self-reliant in such an education system, and that is what makes the nation progress in the coming years. The present paper addresses the enhancement of cognitive skills through the experiential pedagogical module developed by the researcher.

1.1. Experiential pedagogical module

The module so constructed is based on David Kolb's Experiential Pedagogy (Kolb & Fry, 1975) which is categorized under the following four sections viz;

- Concrete Experience
- Reflective Observation
- Abstract Conceptualisation
- Active Experimentation

Two lessons from secondary school Physics text developed by Kerala state SCERT namely Sound and Static Electricity was selected for the preparation of the module since that is more inclined towards the module, which involves real-life experiences of the selected sample. The methodology adopted was selecting relevant activities and experiences that can substantiate the learning made in the two lessons. The activities incorporated in the module included group activities as well as laboratory experiments, field visits, and vicarious experiences which the students could locally relate with their culture and social practices.

1.2. Cognitive Skills

The most important cognitive functions are the primary skill of each individual's human brain. Then the brain being the most essential part of the central nervous system, the primary skills like cognition depends upon the individual brain capacity. All individuals think and act differently according to different situations, and this is primarily because of the differences in their brain capacity in terms of cognition and understanding. Thus a cognitive skill can be understood as the individual capacity or his or her brain's ability in processing and interpreting data, storing the data in memory, and help to reason any general situation encountered in his/her life. Cognitive skills are essential in all aspects of human life, be it in academic excellence or sustainable living. One who has learned to master his cognitive skills can effectively lead a sustainable, happy living (Anderson et al., 2001).

Many organizations develop the cognitive skill set according to their needs and requirements of their achievement and progress plan. The cognitive skill set selected for this study is branched under the following six categories.

- Attention
- Perception
- Memory
- Processing
- Logic and reasoning
- Mobility

Each cognitive skill strength is strengthened by the efficient and effective use and continuous exercise of the cognitive skills selected and practiced. The strength is directly proportional to the efficient practice and the various methods and techniques employed by the individual in improving the selected cognitive skills

(Bloom & Anderson, 2001). The effectiveness of the cognitive skill also depends upon how the information processing is memorized by the individual and how well the individual interprets the learned skill in the real-life surroundings. Though cognitive skills tend to develop throughout human life, they are best and most developed and enhanced in the childhood stages of each individual.According to Piaget's theory of cognitive development, the stage of *'Formal Operational Stage'* is the stage where many individuals find difficulty in reaching the deductive reasoning stage and the hypothetical thinking skills as described by Arnett Jeffry (2004) in his book, *'Adolescence and Emerging Adulthood: A Cultural Approach'*.

The study describes the first important cognitive skill 'Attention' as the essential primary skill which must be mastered by the individuals in order to improve and enhance the secondary and higher-order cognitive skills among humans. The successes of the cognitive skills thus depend truly on the primary cognitive skills of attention and concentration. In spite of the primary cognitive skill mastery in attention, the same attention tends to become weak as we increase in our age, and the bodily hormonal changes play a pivotal role in the cognitive skill practiced by the individual. As humans increase their age, the cognitive skills practiced by them tend to decline even if the individual has mastered the respective cognitive skill initially. So the age-related condition directly influences the cognitive skills acquired by the individual, and this in turn directly increases human anxiety, stress, depression, and tensions. Hence it is the related age conditions of the humans that decrease their cognitive skills, which they have acquired earlier in their life even if they genuinely give attention or concentration over any subject. Sine this happens, even if they try to concentrate affectively, some other pictures and images of other situations or any other event deviate their attention from the subject or topic. Thus the cognitive skill enhancement becomes tough to achieve for them.

Thus the apt age for the cognitive skill enhancement is in the childhood phase, early childhood phase, and the later childhood phase. The situational handling techniques in adult life will be best practiced and applied if the cognitive skill set is mastered in the above-mentioned stages of life viz; the childhood stages. However, the cognitive skill enhancement can be done at any stage of human life, by the regular practice and the controlling of human senses, even if the age-related memory decrease exists as the individual increases in his age. In the present study, the sample belongs to the later childhood stage as described by Piaget in his cognitive psychology (Piaget, 1971). The sample is belonging to PVTG students of Class 8 studying in two different Asram Schools of Kerala.

2.0. Objectives of the study

The objectives of the study are as follows:

- To find out the significant difference between the pre and post-test scores of cognitive skill test of Class 8 PVTG students studying in Asram Schools of Kerala
- To test the significance of each cognitive skill concerning the module in Experiential learning among Class 8 PVTG students studying in Asram Schools of Kerala

3.0. Hypotheses of the study

The hypothesis of the study is formulated as follows:

- There exists a significant difference between the pre and post-test scores of cognitive skill test of Class 8 PVTG students studying in Asram Schools of Kerala
- Each cognitive skill is significant concerning the module in Experiential learning among Class 8 PVTG students studying in Asram Schools of Kerala

4.0. Variables of the study

The variables have been selected on the basis of enhancing the cognitive skills of the secondary school PVTG students so that they can achieve good academic achievement in their secondary school leaving examination and hence increase the pass percentage. Thus more students will be interested in joining higher educational institutions for further study which at present is very less or not present at all. Through experiential learning practices, the student feel interest in learning as well as they can experience responsive learning.

- Dependent Variable: *Test Scores of the Cognitive Skill*
- Independent Variable: *Experiential learning module*

5.0. Operational definitions of terms and definitions used in the study

5.1. Asram School

Asram schools are fully funded schools run by the combined intervention of respective State and central Government of our nation. They meet the educational needs and aspirations of the deprived community students who belong to the primitive tribal groups of each State. The earlier Primitive Tribal Groups (PTG's) is now renamed as Particularly Vulnerable Tribal Groups (PVTG's) as per the recent Government of India regulations. These groups are especially poverty-stricken, and they belong to the rural and most interior parts of the forests of our Nation. The deep forest dwellers and their children are given education through the whole support of honourable Central and State governments through the tribal development projects set up in our Nation. The Asram Schools set up in each State is a complete residential model school wherein the teachers and the students live together and hence developing a close connection within them. These schools are purely built to meet the educational demands ofthe PVTG children who lack even basic amenities in their lives.The teachers help the children from school as well as in their hostels and help them achieve their basic education. Thus the most backward children who come from the interior, rural, and dispersed habitations are given basic education with the complete support of the respective Governments. The areas wherein the PVTG people live are not suitable for the establishments of normal schools, and hence the construction of Asram schools is made in such an area where education can be imparted to these children with proper plug points for their personality development. Thus the sole idea of Asram schools evolves from the main objective of making available a proper educational

atmosphere, in which students are given ample opportunities for their complete and whole personality development. Asram schools are fully residential schools, wherein free boarding and lodging along with other facilities and incentives are provided to the students. Apart from formal education, there are also opportunities to engage in physical activities, meditation, sight-seeing, play, sports, games, and other extra-curricular activities, such as drawing, painting, handicrafts, music, and dance.

Asram schools of Kerala has been operationally defined as those schools that make provision for the PVTG students to reside and study till they complete their formal education. They are provided with co-curricular activities and sports to enhance their affective and psychomotor domain as well.

5.2. PVTG students

Our honourable Governmenthas classified certain groups into Particularly Vulnerable Tribal Group (PVTG) (formerly: Primitive tribal group) based on the sole purpose of helping and the improvement in the conditions of these communities who are living in our Nation with particularly low development indices.

It was the *Dhebar Commission* (1960-1961) who stated that within Scheduled Tribes, there existed a clear inequality in the rate of social development. Thus as a recommendation during the fourth Five Year Plan, a particular sub-category within Scheduled Tribes was created by our Government to identify those groups that are considered to be at a considerably lower level of social development (Sharma & Sharma, 2004). This was created as a recommendation given by the *'Dhebar Commission'* report and also from the suggestions from other similar studies. This sub-category was named "Primitive tribal group" (PTG) then (Dhebar Commission, 1962). The notable characteristics of this identified group involve within them a rural and a pre-agricultural system of existence that is the practice of hunting and gathering, zero or negative population growth, extremely low level of literacy in comparison with other tribal groups.

Those groups which could get into any one of the above said conditions were considered as PTG. Thus according to these recommendations and the conditions put forward by our government, at the end of the Fifth Five Year Plan, our government identified 52 communities of our nation as "primitive tribal group". They were included under this group on the basis of various suggestions and recommendations put forward by the respective Governments of the State (Bagchi & Gupta 2005; Chaudhuri & Chaudhuri 2005) . After the Sixth Five Year Plan, 20 more groups were added to this list of PTG, again 2 more got added in the Seventh Five Year Plan and 1 more after the Eighth Five Year Plan thus making a total number of 75 groups in the primitive tribal group (PTG) list (Mahapatra, 2011). The last and the 75th group identified and included in the PTG list was "Maram" in Manipur State in the year 1993-94 (Singha, 2011). Then after, there were no new additions in the PTG list as on the basis of the 2001 census of India. (Census of India Report, 2001)

The name "*Particularly Vulnerable Tribal Group*" was suggested and proposed by the Indian Government in the year 2006 instead of "*Primitive Tribal Group*"

(Laxmikanth, 2014). Thus the group was renamed as "*Particularly Vulnerable Tribal Group*" then after (Dhar, 2012)

Kerala state government has identified 5 primitive tribes based on their development indices. This includes "*Kadars of Thrissur", "Kurumbars of Palakkad", "Kattunayakars and Cholanaikkans of Malappuram" and "Koragas of Kasargode*". (Ministry of tribal affairs: Annual Report, 2018) The study here focuses on four particular primitive tribes of Kerala residing in Palakkad and Malappuram districts, namely, "*Kadar", "Kurumbar", "Kattunayakar"* and *"Cholanaikkar".*

The study addresses the Class 8 PVTG students studying in Asram Schools, which are exclusively built as per the Government rules and regulations in order to enhance the else deprived social status of the primitive tribal group population.

> PVTG students are those students who are from socially deprived sections of the tribal community who live in the most interior and dense forests of Kerala. The sections include children from 4 selected primitive groups namely, *"Kadars", "Kurumbas", "Cholanaikkars" and "Kattunayakars".*

5.3. Experiential pedagogy

Experiential pedagogy is operationally defined as culturally relevant or responsive teaching where in each student is helped by the culturally competent teachers to relate the course content to his or her cultural context. Such instruction is a form of pedagogy effectively suited to all children from different racial and ethnic backgrounds. By making education culturally relevant, it is thought to enhance academic achievement and hence the self-sustenance and social awareness of the students (Kelly & Crawford, 1997).

Experiential Pedagogy uses the high school science syllabus of Kerala state, and the instruction given by the teachers is culturally relevant and local experiences. The instruction follows a modified form of experiential pedagogy by David Kolb and also finds its roots in the constructivist processes (Kolb D, Fry R, 1975). The term is operationally defined as the pedagogy of experience and creativity, wherein the subject, science is taught through culturally relevant practices and methods that generates interest and makes the learning permanent (Billings L, 1994). This will help in enhancing the cognitive skills of the students at an appropriate age so that they will be benefitted in their later lives. Science, as a subject of interest, must be taught through locally relevant examples and practices so that they can easily club their knowledge with their experience.

> Experiential pedagogy is operationally defined as the methodology implemented by the teacher to the children so as to experience the learning by themselves through locally relevant activities and experiments. Learners thus experience the curriculum and engage themselves in the active learning process.

5.4. Cognitive Skills

Each individual uses his mental processing in a different style according to his/her brain capacity. Cognitive skills are the different mental processes through which an individual can understand basic skills like thinking, reading, writing, and other cognitive processes of the human brain (Bloom, 1956). The study discusses the 6 cognitive skills that can be enhanced for later childhood and adolescent students and can effectively increase their academic achievement as well as their scientific interest.

Cognitive skills are operationally defined as the different mental processes like attention, perception, memory, reasoning, mobility and processing capacity through which one can comprehend the basic thinking skills of the human brain. (Sarmah A, 2020)

6.0. Method of study

The method adopted was the experimental method as it was considered to be the most appropriate method for attaining the objectives of the study. The experimental method is very helpful in obtaining correct and authentic results for the data employed where the subjects can provide cause-effect relationship between them. Moreover, it is the most appropriate method through which the practices can be scientifically and statistically validated.

6.1. Design of the study

Single group pre-test post-test design is followed in this study.

6.2. Sample of the study

For the study in cognitive skill assessment, the researcher used the purposive sampling technique for the selection of the sample. The experimental research was conducted in a representative sample of 80 students of Palakkad and Malappuram districts in Kerala. The students are classified on the basis of their location. Table 1 depicts the break-up of the sample.

Table 1
Demographic data of the participants

S.No.	PVTG Asram School	Location (District)	Students	Number of students	Total students
1.	Malampuzha	Palakkad	Boys	15	40
			Girls	25	
2.	Nilambur	Malappuram	Boys	20	40
			Girls	20	

(Source: Field survey by the authors, 2019)

Table 2
Description of the Sections of tool

S.No.	Sections	Cognitive Skill to be Checked	Type of questions	Total no. of Questions
1	Section 1	Attention	Non verbal	4
			Verbal	4
2	Section 2	Perception	Verbal	6
			Verbal	2
3	Section 3	Memory	Verbal	5
			Non verbal	3
4	Section 4	Logic & Reasoning	Verbal	6
			NonVerbal	2
5	Section 5	Processing Visual	Non verbal	2
		Processing Auditory	Non verbal	6
6	Section 6	Mobility	Non verbal	2
			Verbal	6

(Source: Tool- Cognitive Skill Test, 2019 by the authors)

6.3. Tool of the study

A tool to test the cognitive skills of the students was prepared by the researcher. It was standardized and validated for reliability. The tool comprises of 48 questions in total, and it is divided into 6 sections wherein a set of 8 questions are in each section.The test was developed to measure the cognitive skill of the PVTG students studying at the secondary level in Asram Schools of Kerala. The reliability of the tool was found by Cronbach Alpha Method, and it was found to be 0.732, and the validity was established to be 0.563. The Sections of the tool is described in Table 2.

6.4. Mode of responding

There were 48 items in the cognitive skill test. For each, there were four alternatives in which one was the correct answer. The respondent was asked to put a tick mark (√) in the correct alternative among the four options.

6.5. Scoring scheme

The scoring scheme of the cognitive skill test was as follows: For Correct response, a score of 1 is given, and for Incorrect response, the score is 0.

6.6. Statistical technique

The paired sample t-test, is also often refered to as a dependent sample t-test. This is a statistical procedure used to check whether the mean difference between two sets of observations is zero. In a paired sample t-test, each variable is measured twice, resulting in pairs of observations.

This test is used in order to check the effectiveness of experiential learning module in bringing about significant difference in pre test and post test scores of cognitive skill of the sample used in the study.

The procedure for administering the paired sample t-test is as follows:

- Calculation of the sample mean
- Calculation of the sample standard deviation
- Calculation of the t-test statistic
- Calculation of the p-value that is the probability of t-test statistic under null hypothesis by comparing the calculated t-value to the t-value at (n-1) degrees of freedom where n is the sample size. This value is the critical value of t which is referred by the letter 'T'
- If the calculated t value is greater than the observed T-value, the null hypothesis is rejected which proves that the groups have significant difference between them.

7.0. Data analysis

7.1. Analysis of the significance of the difference between mean pre-test and post-test scores of Cognitive skill of the Experimental group

A paired sample t-test was conducted to determine whether there exists a significant difference between pre-test and post-test scores of *Cognitive skill of the* Experimental groups. *SD*, *t* value, and *r*-value of the mean pre-test and post-test scores of the experimental group is given in Table 3.

Table 3
Data and results of the test of significant difference in mean pre-test and post-test scores of Cognitive skill of the Experimental group.

Experimental Group	N	M	SD	r	t	P
Pre-test	80	12.62	3.78	0.601*	19.88	<0.0001
Post-test	80	30.52	7.26			
* denotes the value of r = 0.601 is significant at 0.01 level						

(Source: Calculated by the authors)

The mean pre-test and post-test scores of the *Cognitive skill of the* experimental group are 12.62 and 30.52, respectively. The *SD* value of pre and post-test of the experimental group is 3.78 and 7.26, respectively. The obtained r value is 0.601, and the *t* value is 19.888, and it is significant at 0.01 level. It shows that there exists a significant difference between mean pre-test scores of *Cognitive skill* and post-test scores of *Cognitive skill* among the experimental groups. That is, post-test scores are significantly higher than that of pre-test scores of *Cognitive skill of the* experimental group.

7.1.1. Discussion of the Result

The result shows that there is a significant difference in the mean pre-test and post-test scores of the *Cognitive skill of the* experimental group. The *t* value obtained is 19.888 and is significant at 0.01 level. The post-test in *Cognitive skill* is significantly higher than that of pre-test scores in *Cognitive skill*. It shows the lesson transcript developed as per the Kolb's Experiential pedagogy was effectively transacted in the Experimental group and is effective enough to enhance the *Cognitive skill of the sample selected as the experimental group*. The results of the pre-test and post-test scores of experimental and the control groups are shown in Figure 1.

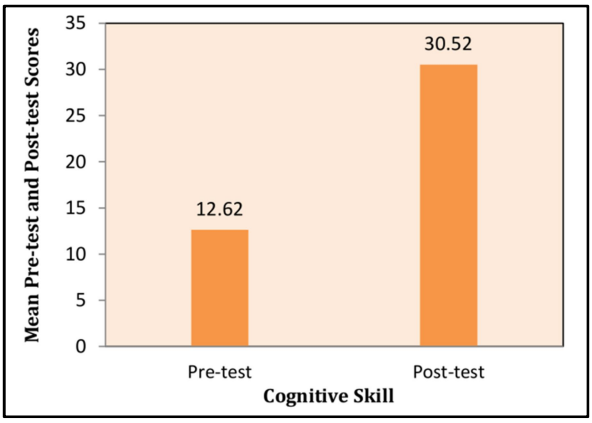

Figure 1
Comparison of pre-test and post-test scores of the Experimental group. (Source: Drawn by the authors)

The graph conveys the pre-test and post-test scores of the experimental group. The post-test scores of the experimental group is higher than their pre-test scores.

7.2. Analysis of the significance of each cognitive skill concerning the module in Experiential Pedagogy among the Class 8 PVTG students studying in Asram Schools of Kerala

A paired sample t-test was conducted to determine whether the cognitive skills are significant with respect to the module in Experiential Pedagogy among the Class 8 PVTG students studying in Asram Schools of Kerala. *SD*, *t* value and *r*-value of the mean pre-test and post-test scores of each cognitive skill of the experimental group is given in Table 4.

Table 4
Data and results of the test of significance of each cognitive skill concerning the module in Experiential Pedagogy among Class 8 PVTG students studying in Asram Schools of Kerala

Cognitive Skill	Experimental Group	n	M	SD	r	t	p
Attention	Pre-test	80	2.62	1.78	0.601*	18.9	<0.0001
	Post-test	80	7.52	2.26			
Perception	Pre-test	80	3.12	1.79	0.656*	19.1	<0.0001
	Post-test	80	7.58	2.29			
Memory	Pre-test	80	2.89	1.75	0.612*	18.9	<0.0001
	Post-test	80	7.92	2.31			
Logic & Reasoning	Pre-test	80	3.15	1.81	0.623*	19.5	<0.0001
	Post-test	80	7.29	2.17			
Processing	Pre-test	80	2.89	1.75	0.607*	19.4	<0.0001
	Post-test	80	7.88	2.67			
Mobility	Pre-test	80	3.23	1.91	0.679*	18.9	<0.0001
	Post-test	80	7.93	2.78			

* denotes the value of r is significant at 0.01 level

(Source: Calculated by the authors)

The mean pre-test and post-test scores of each of the six *Cognitive skills of the* experimental group are 2.62,7.52 3.12,7.58 2.89,7.92 3.15,7.29 2.89,7.88 and 3.23,7.93 respectively. The *SD* value of pre and post-test of experimental group is 1.78,2.26 1.79,2.29 1.75,2.31 1.81,2.17 1.75,2.67 and 1.91,2.78 respectively. The obtained r value and the *t* value for each of the cognitive skills are significant at 0.01 level. It shows that each of the cognitive skills is significant with respect to the module in experiential learning administered among Class 8 PVTG students studying in two different Asram Schools of Kearala. That is, post-test scores are significantly higher than that of pre-test scores of each of the 6 *Cognitive skills of the* experimental group.

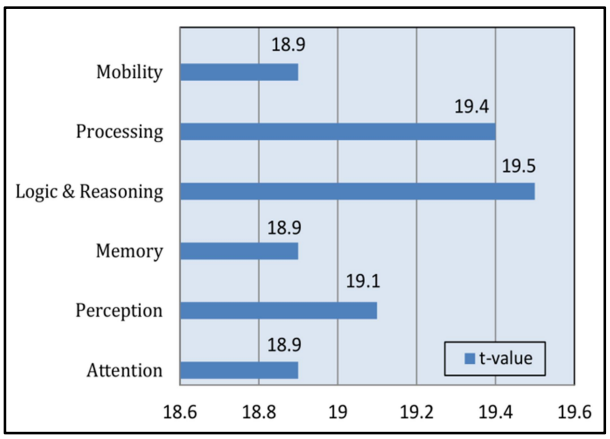

Figure 2
Comparison of t values of pre-test and post-test scores of the Cognitive skills of the Experimental group (Source: Drawn by the authors)

7.2.1. Discussion of the result

The result shows that there is a significant difference in the mean pre-test and post-test scores of each of the 6 *Cognitive skills of the*experimental group. The *t* value obtained for each of the 6 cognitive skills is significant at 0.01 level. The post-test score of the 6 *Cognitive skills* is significantly higher than that of pre-test scores the same. It shows the lesson transcript developed as per the Kolb's Experiential pedagogy was effectively transacted in the Experimental group and is effective enough to enhance all the 6 *Cognitive skills of the sample selected as the*

experimental group. The results of the pre-test and post-test scores of experimental and the control groups is shown in Figure 2.

The graph conveys the t values of the pre-test and post-test scores of the cognitive skills of the experimental group. The mean scores of the post-test of the experimental group is higher than their pre-test scores, and that shows the significance The graph conveys the t values of the pre-test and post-test scores of the cognitive skills of the experimental group. The mean scores of the post-test of the experimental group is higher than their pre-test scores, and that shows the significance of the module administered among the students.

8.0. Findings

- There exists a significant difference between the pre and post-test scores of cognitive skills of Class 8 PVTG students studying in Asram Schools of Kerala
- Each cognitive skill is significant with respect to the module in Experiential learning among Class 8 PVTG students studying in Asram Schools of Kerala

9.0. Conclusion

The study tried to address the effectiveness of a researcher-developed module based on experiential learning principles prescribed by David.S.Kolb in enhancing the cognitive skills of the students. The findings were in accordance with the hypothesis and that the researcher found a significant improvement in the cognitive skills and capabilities of the students after the implementation of the module.

Since cognitive skills are very much important for an individual's progress in his adult life, it is essential to give appropriate training to enhance their cognitive skills at their apt age. The study points out that the development and enhancement of cognitive skills are best achieved in early childhood as well as later childhood years. Thus the training of cognitive skills can be effectively achieved through the experiential pedagogical module.

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