

SCOPE OF CONSTRUCTIVIST APPROACH IN CONCEPT LEARNING – AN EXPERIMENTAL EVALUATION OF A NEW TEACHING MODEL FOR TRANSACTING VIMSATIGUNA

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ABSTRACT

Background: Reforms in pedagogy of Ayurveda hopefully anticipate its shift from teacher centredness to student centredness, from directive teaching to inductive learning, from passive learning to active learning and from memory orientation to application orientation. All these shifts naturally transpire when instructive model of teaching changes to constructivist model. *Constructivism* says that people construct their own understanding, through experiencing things and reflecting on those experiences. Ayurvedic classics leave ample evidences to let us convinced that Ayurveda is adaptive to constructivist model in transacting its content. Concept of *Vimsatiguna*, ten pairs of mutually opposite *Gunas*, is considered as the keystone for building up different theories related to physiology, pathology, drug action, environmental influences and treatment. Constructivist learning of *Vimsatiguna* aims to cultivate a *Guna* perspective among the learners through which they view human body and different variables affecting it. **Objective** of the present study is to assess the effectiveness of constructivist model for transacting *Vimsatiguna*. **Methods:** As a part of preparing a transitional curriculum for I BAMS students, a constructivist teaching module of 2 hours duration for transacting *Vimsatiguna* was prepared and tested in a batch of BAMS students, previously unexposed to the concept of *Guna*, within a month of their admission to the course and the effects were evaluated through pre-test-post-test assessment and feedback proforma. **Results** show 78% comprehension of idea in post test analysis (<0.01) in summative evaluation and 80.9% marks in formative evaluation. The feedback from participants confirmed the role of the module in creating interest, putting clarity in ideas, ensuring participation, bringing out critical thinking and retaining interactive nature. **Conclusion:** Transaction of Ayurvedic concepts like *Vimsatiguna* is adaptive to constructivist model.

Keywords: Ayurveda, *Constructivism*, *Guna*, *Vimsatiguna*

INTRODUCTION

Among many problems affecting quality of graduate education in Ayurveda, absence of convincing methodology for teaching is identified as vital. It was reported that Ayurveda learning is more memory oriented than understanding and application oriented, along with being teacher centred.^{1,2,3} A nationwide survey study conducted by Dr. Kishor Patwardhan et al (2009) regarding the need of Teaching Methodology in BAMS course revealed that contemporary Ayurvedic teaching methodology does not keep up the scientific values and scientific spirit of a young student.⁴ This problem pertains more seriously with learning of Ayurvedic concepts. The challenge offered by Ayurvedic concepts to the scientific temperament of a beginner learner has been repeatedly reported seriously in many discussion platforms by learners as well as teachers. During the induction phase of an Ayurvedic graduate scholar, an abrupt transition from previous learning experience to the new frame of ideas seems to challenge their cognitive integrity. Abstractness of concepts, unfamiliarity with technical terminology, absence of a transitional curriculum and absence of convincing teaching strategies are considered to hold responsibility of the above circumstance.⁵ It was recommended that newer methods of active learning should be introduced in Ayurveda.⁶ R H Singh (2015) envisaged the teaching reforms in Ayurveda as to enable shift from traditional teacher-centred teaching to student-centred teaching where the leader of educational teamship is the student himself, not merely the teacher. In a new model, it is expected that the teacher does not merely transfer a set of information to the students instead, but try to inculcate learning ability and skill in students to construct ideas by themselves.⁷

The case of concept learning in Ayurvedic pedagogy has to be examined separately. In the induction phase of a beginner learner, concept learning is more complicated due to many reasons including strangeness of the concepts, referring an 'unreal' notion to the concepts, abstractness of ideas,

unfamiliarity with technical terminology, learners' non-participation in building up new paradigm, 'forcefully instructed' feel among students and undue stress on blind by hearting and memorization. A new model may ideally be envisaged by assuring learner's participation, respecting learners' capacity to construct ideas through reasoning and logic of his own experiences, not challenging current scientific temperament to a larger extent and imparting due consideration to learners' present level of understanding. Most significantly, it is not necessary to speak in a scientific language of modern science, which they learnt in the previous years, but in a language which they can make sense through logical connections of their own life experiences and common sense. For that, definitely the learner should participate in the process of making sense of the concepts. In a pilot trial reported by Vinodkumar M V et al, the feasibility of introducing activity oriented, interactive module for transacting *Tridoshasidhanta* has been proved.⁸ This study proposes a more structured methodology in concept of *Guna*.

Constructivism as a Teaching Model

Constructivism, in relation to Philosophy of Education, is a theory of learning which says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. Social constructivism, one among many streams of Constructivism, view that learning is an active process where learners should learn to discover principles, concepts or facts for themselves, hence there is importance to intuitive thinking (Brown et al, 1989, Ackerman 1996). Many terms like Active Learning, Learning by doing, Discovery Learning, Inquiry Model etc. come under the umbrella concept of Constructivism in an educational set up. Role of teacher in such settings will be that of a facilitator, where students construct appropriate knowledge guided by the Instructor. Lev Vygotsky (1896 – 1934), a Russian Psychologist, formulated Social

Development Theory in 1962, which became the corner stone of Constructivism later on. On contrary to Instructivism (where teacher instructs something), otherwise known as Transmissionist model, Constructivist model is more student centred and

process oriented. This philosophy believes that people actively construct or create their own subjective representations of objective reality; new information are linked with prior information. (Table.1)

Table 1: Instructive v/s Constructive models

Instructivist model	Constructivist model
Passive learning	Active learning
Teacher is the authority	Teacher takes the role of a facilitator
Teacher centred	Student centred
Achievement/result oriented	Process/Quality oriented
Mainly didactic lecture method is adopted	Active learning strategies like guided discovery, problem based learning, simulation based learning, case simulation, incidental learning etc. can be adopted
Concepts are taught	Concepts are learnt
Less chance for peer interaction	Ample opportunity for peer interaction
Motivation is not an essential component	Motivation essentially associate with process of learning

Constructivist model as corroborated from Ayurvedic classics

From the descriptions on teaching/learning methods (*Adhyayana-adhyapana vidhi*) in classical Ayurvedic textbooks, it is evident that learning in classical age supported inquiry model (posing questions and getting motivated for finding out its answers) of learning. *Charakasamhita*, in its make itself reflects the queries raised by a brilliant learner (*Agnivesa*) to his teacher (*Atreya*). Often the teacher brings out case discussions, demonstrations, simulations etc. to facilitate learning process. In the case of prime theories like Tridosha sidhanta, the concept is typically formative. That means, learners gather different aspects of the theory at different levels of the curriculum, and finality of the concept is not taught in the class room, but gets constructed by learners by their own experiences even outside the class room. The construction lasts even after completion of the formal studies. This fashion perfectly fits with constructivist approach. Interaction initiated by learners which motivates masters seems to form an important learning method as explained in classical literature. Among four types of Sutras enlisted in *Charakasamhita*, *Ekeeyasutra* and *Sishyasutra* refer to discussions initiated by

learners and scholars.⁹ Teacher (Guru) often gets motivated by disciple's question as evidenced from *Charakasamhita*, Sidhithana.¹⁰ The entire world is considered as master for a wise learner, thereby leaving ample scope for discovery learning.¹¹ In Ayurveda man is explained as an epitome of Universe (*Loka purusha samya sidhanta*). This basic understanding, in an epistemological parlance spread many hopes for simulation based learning. Tridosha sidhanta, one of the prime concepts in Ayurveda, is primarily established through such a simulation model by Susruta.¹²

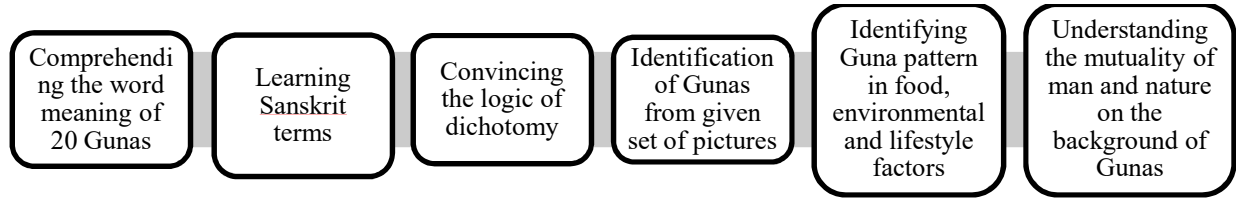
Preparation of Constructivist model for transacting Vimsatiguna

Vimsatiguna, concept of ten pairs of mutually opposite qualities¹³ is considered as the keystone for building up different theories related to physiology, pathology, drug action, environmental influences and treatment. The paradigm shift from physical and chemical understanding of substances (based on modern science) to that of *Guna* spectrum is vital in learning concepts applied in Ayurveda. The present module, prepared as a constructivist model, was aimed to build up a perspective change in learners so that they can identify *Guna* spectrum in the

environmental factors, food and lifestyle factors. In the present module, the concept of *Vimsatiguna* is transacted through a sequence as given in Fig.1.

the present module, the concept of *Vimsatiguna* is

Fig.1: Flow of ideas in the module



The instructional strategies adopted are brainstorming, game, discovery learning, guided discovery, interactive lecture and spot quiz. Abstract

of the content of the module is given in Table – 2.

Table.2: Abstract of the module

Stages	Activity/Strategy adopted	Competency expected
Class - 1		
Comprehending the connotation of <i>Vimsati Gunas</i>	<i>Card game</i> Step – 1: 20 cards with terms like dry, wet, hot, cold, rough, smooth etc. put on the table. 20 Learners can randomly select one card each from the table. They are instructed to form 10 pairs on a common basis which they make out through mutual interaction. Step – 2: Cards with English terms and Sanskrit terms are supplied; each participant reads the Sanskrit names corresponding to the English term.	Acquaintance with English terms indicating <i>Gunas</i> Identifying mutually opposite <i>Gunas</i> Connoting Sanskrit terms for <i>Gunas</i>
Convincing the logic of dichotomy	<i>Discovery learning</i> Two participants were instructed to stand in front of the class with display sheets read as “Constructive change” and “Destructive change”. Other participants suggested each <i>Guna</i> (card holder) to line up in respective group, applying their own logic	Classify the <i>Gunas</i> to Constructive and Destructive headings, there by apprehending the dichotomy
Identifying <i>Gunas</i> in given set of objects	<i>Guided discovery</i> For each pair of <i>Gunas</i> , some pictures were displayed (ppt), participants were instructed to identify <i>Gunas</i> in them	Identify <i>Gunas</i> in the given set and ideas
Class - 2		
Identifying <i>Gunas</i> in, food environmental and lifestyle factors	<i>Spot quiz</i> <i>Discovery learning</i> Displaying different environmental/lifestyle factors and identifying the prominent <i>Gunas</i> behind them	Can apprehend <i>Gunas</i> as real life principles Can view <i>Gunas</i> to be the principles behind common variables related to human being

Testing of the new model

Aim

To probe the feasibility of constructivist model in teaching Ayurvedic concepts

Objectives

1. To transact concept of *Vimsatiguna* through constructivist teaching model based on a module prepared for I BAMS class, previously unexposed to the concept, of VPSV Ayurveda College Kottakkal

- To evaluate the effects of the module transacted through the new model

Methodology

A module for transacting *Vimsatiguna*, based on constructivist approach, was prepared through due discussion with subject experts and educational experts. The module was tested in I BAMS class (2016-17 admission) of VPSV Ayurveda College Kottakkal, with 45 participants. Ethics clearance was obtained from IEC, VPSV Ayurveda College Kottakkal (Ref: No IEC/CI/02/13 dated 26.07.2013). Instruction of the module was completed in two classes with duration of one hour each, within a month of their admission to the course, corresponding to the existing timetable provided by Kerala University of Health Sciences. Sessions were handled by the researcher himself. The outcome of the class was assessed on the basis of summative pre- test and post test questions which evaluated the knowledge of the students before and after class-1. A spot quiz was used to assess the enhanced understanding on application of the concept

developed during the class-1. The questions of the spot quiz were set with an aim of assessing the higher and applied logic building capacity in them. This was assessed at the beginning of class-2. A structured feedback form was used at the end of each class to assess the students feedback regarding role of the module in creating interest, putting clarity in ideas, ensuring participation, bringing out critical thinking and retaining interactive nature, using 1-5 scale, where 1 denoted strong agreement and 5 denoted strong disagreement. Statistical analysis was done using paired t-test for pre-post-test analysis and using Fischer exact test for spot quiz. Student feedback was analysed in percentage of 5 pointed responses in the domains mentioned above.

Results and analysis

45 students participated in the study. Male female ration was 8:37.

As per Table.3, the session showed 78% improvement in comprehension of the idea in post-test analysis which was highly significant ($p < 0.001$)

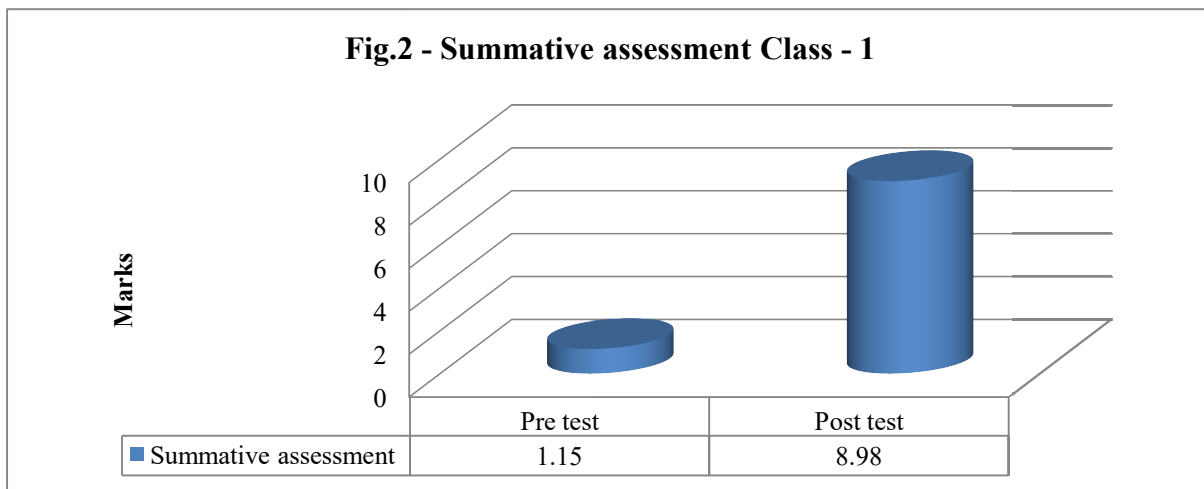


Table.3: Pre-Post analysis Class - 1

Variable	Pre test (n=46)	Post test (n=46)	t-test score	p value	%change
Summative assessment	1.15±1.18	8.98±1.42	25.12	0.001*	78.3%

Spot Quiz was used as a formative assessment tool as well as a teaching strategy. The Spot Quiz

assessment showed average 81% marks at the beginning of Class 2 (Table.4). This shows the

effectiveness of the tool in enhancing learning. The study showed a statistically significant improvement in learning skills using a Fischer Exact test ($p < 0.01$).

Table 4: Formative assessment - Spot Quiz Assessment

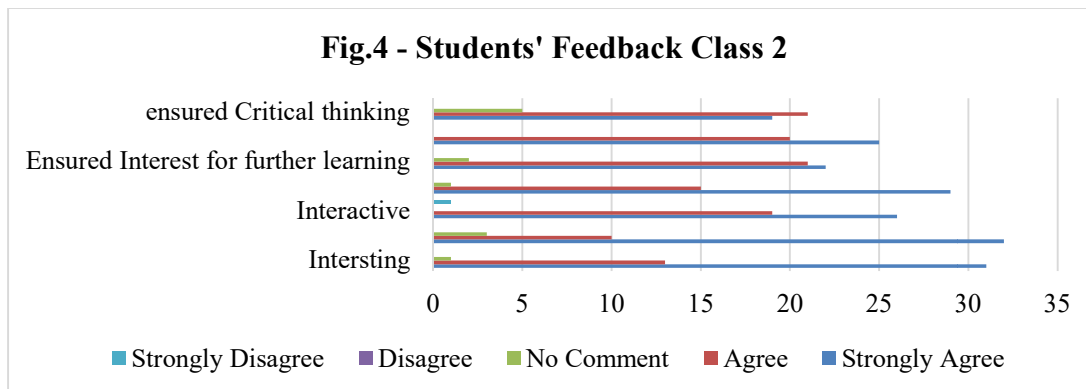
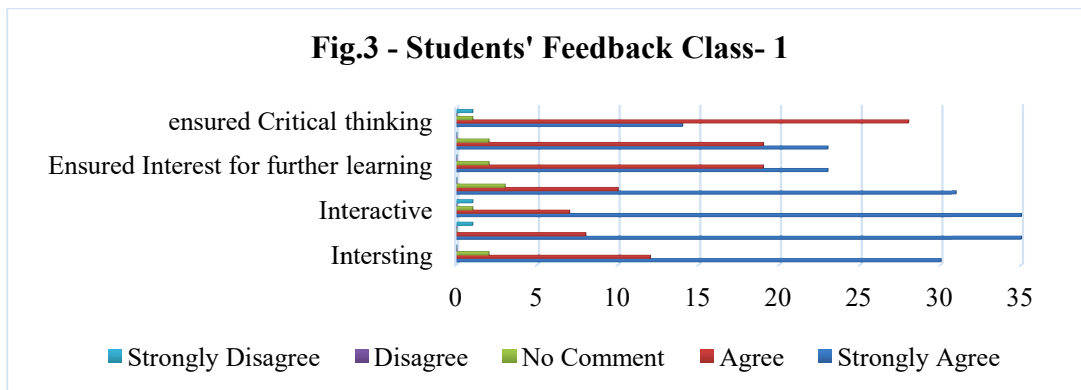
Spot Quiz	Marks	p value
Spot Quiz(Out of 10)	8.09±1.76	0.001*

*Fischer Exact Test

In almost all parameters in the feedback, majority of the participants agreed either strongly or moderately with the almost all aspects being reviewed. (Table.5, Fig.3,4)

Table 5: Students Feed back

Feedback	Strongly Agree		Agree		No Comment		Disagree	
	Class – 1	Class-2	Class -1	Class- 2	Class – 1		Class – 1	Class-2
Interesting	30 (68%)	31 (68%)	12 (27%)	13 (28%)	2 (4%)	1 (2%)	0	0
Ensured participation	35 (79%)	32 (71%)	8 (18%)	10 (22%)	0	3(6%)	0	0
Interactive	35 (79%)	26 (57%)	7 (15%)	19 (42%)	1(2%)	0	0	0
Slides quality	31 (70%)	29 (64%)	10 (22%)	15 (33%)	3 (6%)	1(2%)	0	0
Ensured Interest for further learning	23 (52%)	22 (48%)	19 (43%)	21 (46%)	2 (4%)	2 (4%)	0	0
Interesting	30 (68%)	31 (68%)	12 (27%)	13 (28%)	2 (4%)	1 (2%)	0	0
Ensured participation	35 (79%)	32 (71%)	8 (18%)	10 (22%)	0	3(6%)	0	0
Clarity of ideas	23 (52%)	25 (55%)	19 (43%)	20 (44%)	2 (4%)	0	0	0
Ensured Critical thinking	14 (31%)	19 (42%)	28 (63%)	21 (46%)	1 (2%)	5 (11%)	0	0



68% in both the classes strongly agreed to remark the module as interesting, almost equal response was marked (12%) as to have moderate agreement with the same. No disagreement was noted in both the groups.

Great majority of students agreed that the module ensured participation. Both the groups strongly agreed (79%, 71%) to say that the module ensured students' participation, moderate agreement was noted by 18%, 22% respectively. 3% participants in class-1 and 2% in class 2 disagreed with it.

79% in class-1 and 57% in class 2 strongly agreed to comment that the class was interactive. Moderate agreement was shown by 15% and 42% respectively. 2% made no comments, 2% each in both the classes disagreed strongly to say the class was interactive.

Regarding quality of slides displayed, 70% and 64% participants strongly agreed with good quality, in class-1 & 2 respectively, 22% & 33% moderately agreed and 6% & 2% respectively put no comments. Disagreement was not at all raised in both the classes.

52% and 48% learners strongly agreed that the module ensured interest for further learning. Moderate agreement was noted by 43% and 46% learners respectively. 4% each had no comments. No disagreement was noted in this evaluation.

52% and 55% in class-1 & 2 respectively strongly agreed on the clarity in ideas transacted in the module. Moderate agreement was noted by 43% in each class, whereas no disagreement was noted here in both the groups.

Majority agreed on the chance of critical thinking, strongly by 31%&42% in class-1&2 respectively and moderately by 63% & 46% respectively. 2% & 5% respectively had no comments. No disagreement was shown in both the classes.

DISCUSSION

The present model is a constructivist one in the sense it allows the learners to construct the concept through minimum instruction from the teacher. The teaching strategies adopted in the present model

typically generate constructivist ambience in the classroom. Also, the model is activity oriented, student centred and process oriented, as idealized in constructivist model.

Vimsatiguna was selected as the content of the module considering the vitality of the concept. *Guna* is a common base of explaining almost all aspects of human body and drug action and even interaction with surroundings. Bringing out a *Guna* perspective on human experiences makes easy entry to almost all fundamental considerations of Ayurvedic principles. Three basic rules those make the theoretical platform of Ayurveda viz. *Samanya-visesha-sidhanta* (law of similar and dissimilar), *Karya-karana-sidhanta* (Law of causality) and *Loka-purusha samya sidhanta* (Man as an epitome if universe) can be illustrated through taking *Guna* concept as a model. That is really the primacy of concept of *Guna* among Ayurvedic concepts. Being applicable to almost all variables to which human body is exposed, *Gunas* are ideal and amenable for constructivist strategies like discovery learning, interactive learning etc.

The sequencing of ideas contained in the module was done so as to make sensible expansion of ideas starting from mere word meaning. The terminology related to the *Guna* spectrum is often familiar to the learners, with their rough and non-technical meanings. So, direct introduction of such terms will not make them muddled. Starting from such rough notions, through the game given in the module they reach in more precise meanings of the terms. Game ensures learner's participation also. The module never tries to 'define' the terms precisely, but to explain the findings in terms of the *Gunas*, as exemplars and non-exemplars (exemplar is an entity which suits to the definition given and non-exemplar which stands outside) with the help of pictures of common things exhibiting prominent *Gunas*. Classifying things into exemplars and non-exemplars, as it is used in introducing a concept to beginner learner, is a conventional model in concept learning.

The classification was done on two categories: Constructive and Destructive, the two main domains of changes anywhere in the universe. The primary idea of these two categories was given prior to the classification. Classification of things is said to be the primary stage of reflective practices in any discipline.

Spot quiz displays some questions which makes elaboration of ideas suggesting *Guna* behind some situations. Answering such a question assesses the level of understanding on one side, and on the other, bring out further clarity on the terms they learnt. Thus, that method was taken as a formative assessment tool also.

Identifying *Guna* pattern in the environmental factors, common food items, diurnal pattern, geographical distribution etc. was done with the help of pictures showing such variables. The participants were instructed to identify some *Gunas* related to the situation in the picture, guided by the instructor. This was done with two intentions. One is to make sure that learners attained higher levels of reflective practices, and the other, to convince them on the real life effects of *Guna*.

The teaching strategies were selected with an intention to make a modest starting through a simple game, which ensure learners participation and putting a simple entry to otherwise unfamiliar principle like *Guna*. Inculcating a sense of ordinariness is very important in introducing new theories, that too, pertaining to a discipline which the learners have no prior exposure. Advancing to higher strategies ensured reflective practices like comparison, classification, real life association and naturalization of concepts.

Even though Constructivism appeared as an independent teaching model in education in the recent past only, the prime idea of the model is adopted in ancient teaching methods of Ayurveda as evidenced from Ayurveda classics. Hence, adopting such a model in transacting any concept in Ayurveda will not conflict to the spirit of classical Ayurvedic teaching.

The results show effective transaction of the core subject. Difference in scores in pre-test post test assessment, being statistically highly significant there is a real change in the knowledge about the subject matter. In the formative assessment, spot quiz assessed the change in understanding and application levels of the learners, found to be highly significant. The feedback from learners showed significant impression of the module to be interactive, interesting, ensuring critical thinking, creating interest for further learning etc. These aspects reflect the constructivist nature of the module. The model simply overcomes the usual accusations about present transaction of concepts viz- memory orientation, passivity of learners, teacher centredness, learners' notion of getting forcefully instructed etc.

CONCLUSION

In principle, constructivist model is nothing new to Ayurvedic teaching, but its adoption to the current teaching scenario is not attempted much. The review on constructivist method as well as the results of experimental evaluation shows that concepts like *Guna* are practically amenable for constructivist model. This can be extended to other concepts like *Tridosha* etc. which are typically founded upon concept of *Guna*. Through the new model some of the typical hardships in contemporary concept learning can be overcome to a greater extent. This method can also be extended to Ayurveda pedagogy in the form of transitional curriculum implemented during the induction phase of Ayurveda graduation course. This needs due consideration while planning educational reforms in Ayurveda. Curriculum reforms without considering teaching reforms will not yield expected results.

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