EFFICACY OF APPLYING REFLECTIVE DIALOGUE ON UNDERGRADUATES' LEARNING ATTRIBUTES IN *AYURVEDA RASA SHASTHRA*

U.R.S.R.K.Senarathne

Senior Lecturer grade II, Department of Ayurveda Pharmacology, Pharmaceutics and Community Medicine, Faculty of Indigenous Medicine, University of Colombo

Abstract

Past experience of more informative lectures given to the students under the topic of Appliance (*Yantra* used is *Ayurveda Rasa Shastra*) has shown less effectiveness in the assessment from a previous batch of undergraduates. Though the students could retrieve the information, creativity and applicability like high level of learning objectives have not been well performed. It was realized that silent listeners and passive learners can achieve only the low level of learning outcomes mentioned in Bloom's Taxonomy. To improve the undergraduates' attributes of retention, identification, application and innovation regarding ancient appliances used in *Ayurveda Rasa Shasthra* (Alchemy), the reflective dialogue method of active learning was applied. The expected undergraduate batch (n=168) was considered as research group A and the previous parallel batch which was learned without using this method was taken as group B (n=159). Group A encouraged self-reflection and peer dialogue about the subject matter by providing subject guidelines three days before the scheduled lecture. Dialogue with the lecture was continued at the beginning of the lecture, during each important point, and at the end of the lecture. Randomly selected two students got the opportunity of discussion per each point. Cognitive levels of students' learning in both groups were assessed by the structured essay questions created by following the stages of Bloom's Taxonomy. Results were compared by using paired and unpaired t–test. The overall marks earned by Group A were higher than Group B. There was a significant difference between the two clusters. Similarly, there was a significant difference among the levels when the questions went up to the upper hierarchical planes. The mean difference between each level of the corresponding groups again exhibited a significant difference when doing the evaluation. ($p < 0.001$). The reflective dialogue method of active learning was more effective than teacher-oriented learning, and the students' applicable knowledge of *Yantra* and the novel invention of appliances were enhanced by the discussion method.

Key Words:

Reflective dialogue, active learning, Bloom's Taxonomy, Ayurveda Rasa Shasthra, innovation

EFFICACY OF APPLYING REFLECTIVE DIALOGUE ON UNDERGRADUATES' LEARNING ATTRIBUTES IN *AYURVEDA RASA SHASTRA*

U.R.S.R.K.Senarathne
Senior Lecturer grade II, Department of Ayurveda Pharmacology, Pharmaceutics and Community Medicine, Faculty of Indigenous Medicine, University of Colombo

INTRODUCTION

Ayurveda Rasa Shasthra (Alchemy) is one of the pharmaceutical subjects which includes herbal, metal, mineral and animal-originated materials (Savrikar & Ravishankar, 2011). There is a specific apparatus called *Yantra* used in manufacturing such medicines as there are specific procedures to convert these ingredients in a way of precocious intake into the body. The teacher-centered learning approach (Mahmood et al., 2011) used in a previous batch has shown less interest in the lesson and poor performance under the creative type of questions in the continuous assessment (CA). To improve the student's knowledge in the direction of applicability and inventiveness like high-order cognitive skills, the teaching-learning method was changed for the same topic in the next parallel batch. The development of the cognitive domain of the student is important as the undergraduates are expected to accomplish the professional level and their attributes will enlighten their future. An alternative to the traditional approach to learning, it is better to practice a special kind of discussion to expand the students' listening capacity and to cultivate individual reflection for student-centered active learning (Ozola, 2014). Focusing on the development of students' knowledge and intellectual skills in line with the Bloom's Taxonomy of cognitive skills (Ahmed, 2021), the reflective dialogue method of discussion was applied. Reflective dialogue is one of the active learning components mentioned by Fink L. D. (2003). Implementation of such kinds of discussions in any subject as a tool of teaching-learning enhances the learning and expert development in higher education. It will also encompass engaging in meaningful and respectful discussions that challenge assumptions, explore perspectives and adoptive critical thinking.

METHODOLOGY

Though the teacher-centered passive learning type of lecture series done previously are full of information, and students have behaved in a silent and obedient manner, they could retrieve the subject content well. However, their applying, analyzing, evaluating and creating like high level of learning objectives have less upgraded. It was understood that the teaching learning method should be reformed to boost the students' learning attributes. Research students were designated from the two parallel batches of second professional BAMS (Batcheler of Ayurveda Medicine and surgery) continuing their studies under the same syllabus. Group A, (n = 168) was the batch who applied reflective dialogue type of teaching learning method, and the other batch who learned earlier without using a new system was considered as a control group (Group B) (n=159). The content of a six-hour lecture series on the topic of special instrument used in Ayurveda Rasa Shastra (*Yantra*) was subjected for the evaluation. At the end of the session, both groups faced the same assessment test and then the results were compared. The reflective dialog method was applied as an active learning method to Group A and distributed handouts containing subject guidelines three days before the scheduled lecture. They were instructed to write notes on what they know about the topic and subtopics (self-reflection) and to have discussions with their colleagues (dialogue with others/ peers) and improve their notes. Finally, they had to express their ideas to the lecturer at the beginning of the session. Then, they were taught the subject by using a PowerPoint presentation. A discussion with the teacher continued during the particular point of the subject and students had to summarize the respective session at the end. Randomly selected two students got the opportunity to participate in a discussion per each point. The hierarchical level of students' achievement was assessed by the structured essay questions. Level one (L_1) included five questions for remembering purpose and L_2 encompassed 04 questions for identification and differentiation of *Yantras*. There were three questions in Level 03 (L_3)

relevant to the application of *Yantra*. In L_4, two questions were placed to assess their capability of comparison of ancient apparatus with modern apparatus and modify some appliance by using ancient concepts. L_5 question was to imply their creativity of new apparatus to make quality products according to the requirement under the given circumstances (**Table: 1**). Paired t- Test and Wilcoxon signed rank test were applied to evaluate the performance in each level of questions comparatively among the groups and to check the level gap comparatively. Level of significance considered for 't' test ('p' Value) is, insignificant > 0.05, significant ≤ 0.05, ≤ 0.01 and highly significant ≤ 0.001.

RESULTS AND DISCUSSION

While comparing the results for each hierarchical level of assessment, overall marks earned by the student group A has shown great enough compared to Group B and their difference was highly significant (P <0.001) (**Table: 2**). When comparing the mean value of difference of each level of $L_1$and L_2, L_2 and L_3, L_3 and L_4 and, L_4 and L_5 of group A with Group B, that differentiation also exhibited the significant difference (**Table: 3**) and the level gap of group A was less than group B. The marks of each nearest levels in group A were compared by paired t – test and Wilcoxon rank test for the Group A. The difference between L_1 and L_2, L_3 and L_4 and L_4 and L_5 was significant (P <0.001); but the change that occurred among L_2-L_3 was not great enough to exclude the possibility that it is due to chance (P = 0.458).

CONCLUSIONS/RECOMMENDATIONS

Statistical comparison of the results showed that a significant transformation was observed from Group A. It might be due to the student's active engagement in the lecture. There was a momentous difference among the cognitive levels within the groups. The number of students earning high marks showed a gradual decrease when achieving the upper hierarchical steps in both groups. It is obvious that the development of cognition and critical thinking are not an easy task. The gap of the nearest steps of Group A was less than Group B's level diverse and it was a significant change. As per the above analysis, it can be concluded that the reflective dialogue like active learning methods is effective for the shortened knowledge gap and it will direct towards the highest achievement of the profession. The reflective dialogue method is one of the effective ways of teaching and learning and can be applied to enhance undergraduates' learning attributes in Ayurveda Rasa Shasthra. Furthermore, this method will be simply implemented to any other subjects as well to establish the students' higher performance.

Table 1: Evaluation of students' cognitive level equivalent to Bloom's Taxonomy by the given questions

Level	Learning objective of the lesson	Question / assessment relevant to the Learning outcome	Marks allocated	Time allocated (minutes)	Evaluation of Bloom's hierarchical level
L_1	To identify and differentiate Yantra/apparatus	Q_1-Q_5 (05 quizzes)	05	(10)	Knowledge
L_2	Identify the utility of Yantra	Q_6 – Q_{10} (04 quizzes)	05	(10)	Comprehension
L_3	Apply the knowledge for practical purposes	Q_{11}– Q_{13} (03 quizzes)	05	(10)	Application
L_4	To equate ancient apparatus with modern apparatus,	Q_{14}– Q_{15}			

	modify Yantra by using ancient concepts	(02 quizzes)	05	(10)	Analysis
L_5	Design new apparatus according to the requirement under the given circumstances	Q_{16} (01 quiz)	05	(10)	Evaluation

Table 2: Comparison of results among Groups A and B

	Group	n	Missing	Mean ± S.E.M	t -value	Confidence Interval	P - value	Significant Level
L_1	A	168	2	4.278 ± 0.0326	t = 53.740	2.264 to 2.436	<0.001	HS
	B	159	6	1.928 ± 0.0287				
L_2	A	168	2	4.003± 0.0359	t = 36.868	1.825 to 2.031	<0.001	HS
	B	159	6	2.075± 0.0381				
L_3	A	168	2	3.956± 0.0472	t = 34.072	2.032 to 2.281	<0.001	HS
	B	159	6	1.800± 0.0415				
L_4	A	168	2	2.852±0.0592	t = 17.539	1.236 to 1.548	<0.001	HS
	B	159	6	1.461±0.0520				
L_5	A	168	2	2.199±0.0997	t = 11.677	1.231 to 1.729	<0.001	HS
	B	159	6	0.719±0.0756				

Data Mean ± SEM→Mean ± Standard Error of Mean,↓ = Decrease, ↑= Increase

Table 3: Comparison of difference of each levels among Groups A and B

Level gap	Group	Number of participants	Missing	Mean ± S.E.M	t - value	95%Confidence Interval of means	P - value	Significant Level
L_1-L_2	A	168	2	0.275± 0.0598	t = 6.030	0.285 to 0.560	<0.001	HS
	B	159	6	-0.147± 0.0462				
L_2 -L_3	A	168	2	0.0472± -2.852	t = -35.290	-0.390 to -0.0663	(P = 0.006)	HS

	B	159	6	0.339± 0.0689				
L_3-L_4	A	168	2	-2.852± 0.0472	t = 34.072	-3.369 to -3.013	<0.001	HS
	B	159	6	1.800± 0.119				
L_4-L_5	A	168	2	0.654± 0.119	t = -0.564	-0.396 to 0.219	P = 0.573	NS
	B	159	6	0.742± 0.0990				

Data Mean ± SEM→Mean ± Standard Error of Mean,↓ = Decrease, ↑= Increase

REFERENCES

Ahmed, M. (2021). *What Is Bloom's Taxonomy? Applications & Importance Of Bloom's Taxonomy*. https://www.iitms.co.in/blog/curriculum-

Fink, L. D. (2003). A self-directed guide to designing courses for significant learning. *University of Oklahoma, February*.

Mahmood, M. A., Tariq, M., & Javed, S. (2011). Strategies for Active Learning: An Alternative to Passive Learning. *Academic Research International*, *1*(3), 193–198. www.savap.org.pkwww.journals.savap.org.pk

Ozola, S. (2014). Views on Taxonomy and Learning. *Education in a Changing Society*, *1*, 152–159.

Savrikar, S. S., & Ravishankar, B. (2011). Introduction to 'Rasashaastra'- The iatrochemistry of Ayurveda. *African Journal of Traditional, Complementary and Alternative Medicines*, *8*(5 SUPPL.), 66–82. https://doi.org/10.4314/ajtcam.v8i5S.1