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Knowledge Assessment of Undergraduate Dental Students Using Conventional Method of Teaching and Mind Mapping Method of Teaching

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Abstract: Assessment of teaching method is important to find the outcome. As a result, we used conventional and mind mapping to analyze BDS students' learning ability. Students were assessment based on Pre-evaluation and Post-evaluation tests. The findings were evaluated after the students were given the topic. Student evaluation was based on conventional learning method and the mind mapping method. The obtained results were subjected to statistical evaluation which showed that mind mapping methodology was more effective, more inventive and successful than the conventional method in terms of learning and retaining information.

Keywords: Mind Mapping, Conventional learning, educational practices, modern learning., etc

Introduction:

We are now living in the contemporary period. Future developments are occurring everywhere on planet and education has taken a prime place. The educational practices and system of the country determine its success and growth. To stay up with developments, the educational system will also need to be updated. Delivering education in the same way as in the past is not beneficial. New approaches must be used to strengthen the educational system. The capacity to incorporate innovative approaches into the educational system shows how critically important it is. [1-3]

The use of evaluation or additional techniques as a part of curriculum has developed more widely in recent years among medical and dental educational institutions. Different teaching strategies have been sought by educators for the dental academic programs. The current curriculum has shifted from teacher-centered methods to approaches that give preference to student learning. In educational institutions, a variety of teaching techniques are used, including lectures, dialogues, computer-assisted learning, audiovisual sources, video-based learning, demonstrations, and scenario-building. [4]

The teaching-learning process in dentistry has been amended due to the present dynamic and simple access to information. In addition to other options, virtual libraries, search engines, open access to scientific production, and projects have altered the student profile. Rather than being the object of learning, they are now the topic; the instructor, in turn, acts as a mediator in the process of creating scientific knowledge [5-6].Numerous academic disciplines have examined traditional and active teaching methods and held conversations about the most effective ways for encouraging learning. Classes using active teaching techniques have become more popular in dentistry [7-8].

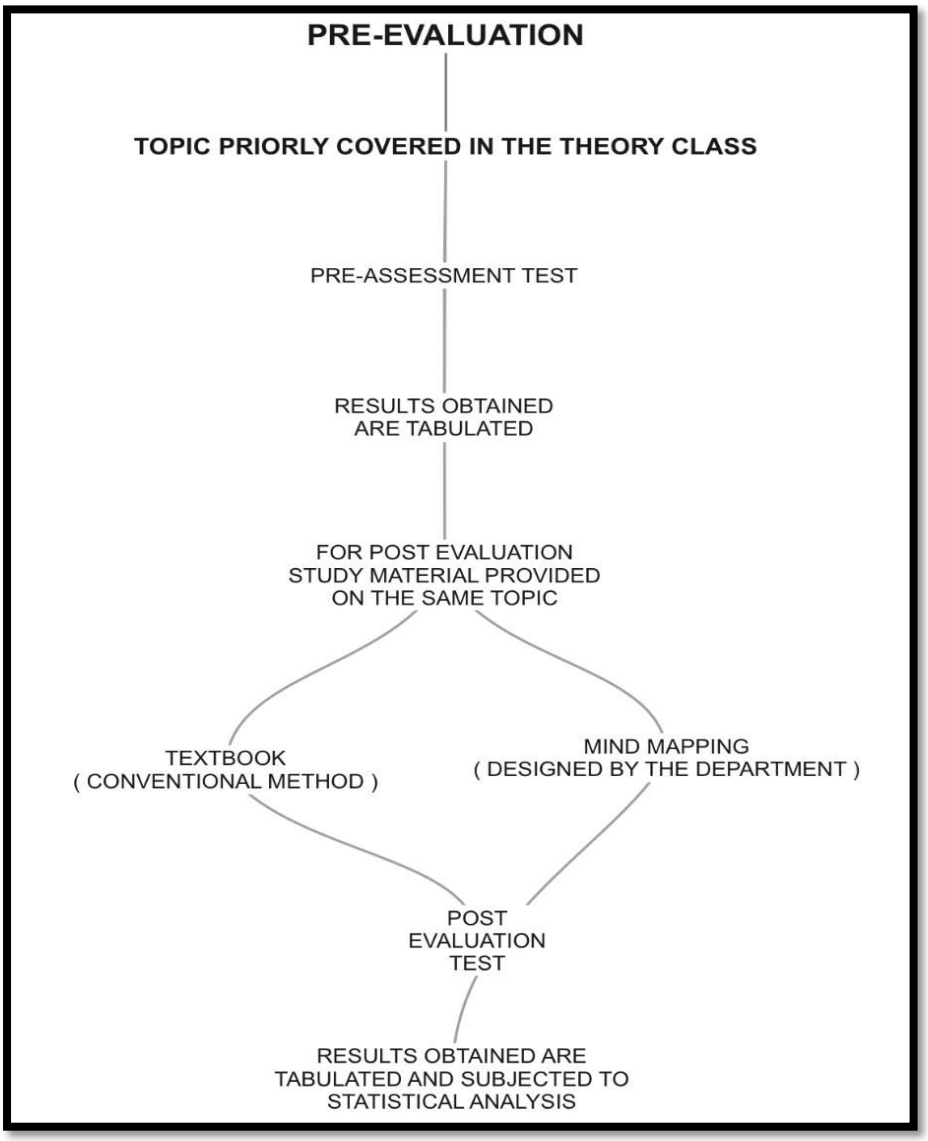
Modern, trend-conscious teaching approaches are also required in medical education. One such method is the "Mind Mapping Method." [9-10] This method was created by Tony Buzan, who used a map with a - central image, main themes extending from the central image, splits with key images and key words, plus affiliates forming a connected nodal structure [3]. It enables the learner to fit a lot of information on a single page, enabling the students to swiftly examine the subject matter with a short scan. Instead of writing down the knowledge in sentences, the student can alternatively represent it in diagrams. This approach is becoming more and more popular since it improves self-learning and simplifies complicated sentences [11-16]. Data also demonstrates that mind mapping improves one's ability to retain information more accurately.

Methodology:

The study was conducted in the Department of Oral Medicine and Radiology of JSS Dental College and Hospitals, Bannimantap, Mysore.

An evaluation-based study was conducted with 50 final-year BDS students from JSS Dental College and Hospitals in Bannimantap, Mysore. Participation in the study was entirely voluntary and strictly confidential . Students were assigned into two groups at random: Group A and Group B. Group A was subjected to Post Conventional Method learning, whereas Group B was subjected to Post Mind Mapping Method learning, with both groups having 25 students each. Both the group were subjected to Pre-assessment and Post-assessment evaluation. The pre-evaluation test consisted of ten questions, each worth one

point. The topic up for examination was oral submucous fibrosis.The topic was covered in theory class before to the Pre evaluation exam, and the next day the Pre evaluation test was held for both Groups (A and B), and the acquired marks were calculated. Students were given two methods of study material to cover the topic, one being the traditional book technique and the other being the department-designed Mind Mapping method. Students were given two days to prepare using the materials supplied. Following that, a post-evaluation exam was conducted, consisting of 10 questions, each worth one mark, and marks are tabulated and Pre & Post marks were compared.The results obtained were tabulated and calculated for further statistical evaluation to analyze the gain in the knowledge about the topic using the study material from the different methods of learning.



The methodology of this research article is depicted methodically using mind mapping.

JASP (Jeffreys' Amazing Statistics Programme) 0.17.3 version was used for statistical analysis, as well as descriptive and analytical tests such as mean, standard deviation, variance, coefficient of variation, and Chi-square test. The difference in mean knowledge score between groups was calculated before and after the intervention. Shapiro-Wilk was used to calculate the percentage knowledge increase and to measure knowledge gain. Before and after the intervention (conventional technique and mind mapping method), the difference in mean knowledge score between groups A and B was computed. The Chi-square test was used to assess knowledge acquisition between the conventional method and the mind mapping method among the selected Groups (Group A and Group B) of students. $P \leq 0.05$ was considered as statistically significant.

Results:

Pre-assessment Group A and Group B, as well as Post Regular Method and Post Mind Mapping Method, were subjected to Comparative Statistical Analysis. The data analysis revealed that the mean Pre-assessment score for Group A and Group B was 5.96 and 5.68, respectively. The standard deviations for Groups A and B were 0.88 and 0.47, respectively, with coefficients of variability of 0.14 and 0.08. Furthermore, Shapiro-Wilk was calculated, yielding values of 0.72 and 0.59 for evaluating the normality of Pre-assessment Group A and Group B [Table 1]. The frequency was tested to evaluate the common score that students scored. The frequency was verified to assess, and the common score in both groups was 6, which was scored by 15 to 17 students in respective groups [Table 2]. The data score was represented visually in the form of a distribution plot and a pareto plot for the distribution of scores and frequency counts at different levels in both groups [Figure 1,2].

Statistical analysis was also performed for post regular method teaching and post mind mapping methodology studying. The results indicated that the mean value was 5.64 and 8.04, respectively. The standard deviation was 1.60 and 1.76, while the coefficient of variance was 0.28 and 0.22, respectively. The Shapiro-Wilk test yielded values of 0.88 and 0.87 [Table 3]. The common score in both groups of post-assessment was 6,8, and 10, which were scored by 11 students after conventional method of teaching and 8 and 9 students after mind mapping method teaching, respectively [Table 4]. The data was again represented using a distribution plot and a pareto plot to show the distribution of scores and frequency counts at different levels in both groups [Figure 3,4]. The Chi-Square test was used to compare the intergroup comparability of students after the standard teaching technique and after the mind mapping method. The score of 64.09 was statistically

significant (P < 0.001). Students who were tested after the mind mapping technique teaching demonstrated a statistically significant gain in knowledge when compared to students who were evaluated after the usual conventional method teaching [Table 5].Along with the Chi square, the Mann Whitney U test was performed in this study for Groups A and B [Post regular way of teaching and Post mind mapping method of teaching] to demonstrate the change or increase in knowledge in comparison to each other. According to the statistics, the whitney score was 6.50, with a p value of 0.045 (P Value < 0.05). [Table 6] revealed that there was a statistically significant difference in knowledge increase between the two sample groups. The data is shown using descriptive plots and bar graphs [Figures 5 and 6].

Discussion

In this study, utilising the Conventional approach and the Mind Mapping method, there was a substantial improvement in knowledge when compared to the Pre assessment group and the Post assessment group. Manish et al [18], discovered similar results with score of 5.29 and 8.73 when discussing the increases in knowledge score between the Pre and Post intervention groups, which demonstrated a statistically significant increase. Alma et al [30], discovered similar results in different approach of using mind mapping method,they found that the mind mapping approach in descriptive analysis, displaying a substantial increase when creating a descriptive data which will further increase the reproducibility of the subject with ease, the values obtained for pre and post intervention was 45.8 and 58.5 respectively.In terms of broadening concepts, enhancing inventiveness, structuring phrases, and organizing ideas, the mind mapping approach adds to students' writing skills in Descriptive phrases. However, there are certain drawbacks to mind mapping. The mind mapping approach has been criticized for being time-consuming. This is relevant to the discovery of Buzan [17]. Furthermore, according to McGriff [18], this statement was incorrect, because when utilizing this method in an exam environment, students who are unfamiliar with the notion/concepts,by using the mind mapping strategy they can improvise in the learning [19]. For students, education is an essential aspect in their lives, and they must achieve the maximum level of knowledge in the shortest amount of time. To address this, several technological advances have emerged in the modern era one such being the mind mapping method [20].

The modification or changes in a student's way of learning can be brought about by a number of variables, including the ones listed below. First, the educator should identify each student's attempts, their involvements, and learning attainment or patterns by observing and should also openly acknowledge by awarding them additional points. This praise can boost students' self-esteem and improve their perception about their instructor

as well as the interest towards the subject. Second, putting out the results at the conclusion of a learning activity encourages students to compete positively in accomplishing the objective or recognition and getting better results in subsequent sessions. Third, students became acquainted with the multidisciplinary teaching technique, by using mind mapping method for improving the concept knowledge and easy learning [21-23].

Other listings which can give some benefits like the following approaches, which makes the Multiple Intelligence Learning concept with Mind Mapping to be used successfully. With help from the Different Intellects learning model. It is thought that mind mapping might help students become more creative thinkers. By way of the model, the student's brains are encouraged to use creativity, to communicate their thoughts, and to aid them in verbally conveying thoughts or concepts. The teacher can act as a catalyst and arbitrator for a more efficient educational settings. By putting the method into application, a through observation can be done, teachers are given the chance to objectively administer student evaluations.

The instructor may stay unbiased by using an evaluation form for evaluations. The concept aids in training students to be more active and reflective of their learning activities, allowing their brains to focus completely on the learning process. Students grasp the connections of topics learnt through the creation of mind maps. With the model's adoption, teaching and learning activities become more orientated and systematized, and students' attention may be focused on learning. The approach allows students to learn what they desire through researching investigations into their own knowledge and using their observations as prior knowledge to execute post- educational activities. The concept allows students to learn based on their abilities, and it employs an interactive process to determine what the students can do. The approach encourages students to participate in their learning by allowing them to interact with the subject, their peers, and their professors [24-26].

Few limitations or constrains might be encountered over the method of using multi-disciplinary teaching method like mind mapping, we can list them as follows: Due to time containments, the teacher may not be able to provide complete knowledge on the topic to the students. Certain subjects might be difficult for the instructor to replicate completely with full justice in the method, the instructor must be more creative in developing settings for concepts acquired to make it understandable. Some students will be new to learning from the method of mind mapping, so therefore learning the topic in that and replicating in the exam might be an issue in some students [27,28]. The mean score of students in the post mind mapping method of teaching group was considerably higher than the conventional or regular method of teaching, according to this study. The findings are

equivalent with those of Kalyanasundaram et al. in 2017 [11] and Eshwar et al. in 2016 [7], who concluded that mind mapping was more effective than the conventional ways of reading textbooks and lecture-based learning, (5.29 ± 2.52) respectively. Wickramasinghe et al. in 2008 [29] and Deshatty and Mokashi in 2013 [6] both found that mind mapping method of teaching (6.09 ± 2.04)was an advantageous educational resource for medical and dental students.

Conclusion

Through the application of the mind mapping technique, the mind is prepared to use information rationally and imaginatively to generate an image. The linear perspective is provided in the mind mapping approach once the fundamental thought has been articulated. It is helpful for both individuals and organizations, where it may be more successful than written suggestions for improvement. This method is suitable for both teachers and students for topics that are common and difficult but easy to understand. It additionally boosts student knowledge for better understanding. This technique increases the creative potential of original concepts and helps to increase desire for educational endeavors. The interest of the viewer is captured and made pleasing to the reader's eyes via the use of enticing colors, graphics, and flowcharts, revitalizing the enthusiasm in the classroom. Multidisciplinary teaching approaches, such as mind mapping, can be utilized as an innovative tool to simplify and ease the teaching process. This form of teaching makes the learning and teaching processes more efficient and participatory; students will find this way of teaching to be much simpler as retaining topic knowledge becomes easier and better. As students have a better comprehension of the subject, their knowledge efficiency improves as they study using the new technique.

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Nil

Conflicts of interest

There are no conflicts of interest

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Figure 1a - Distribution Plots [Pre - Assessment (Group A)]

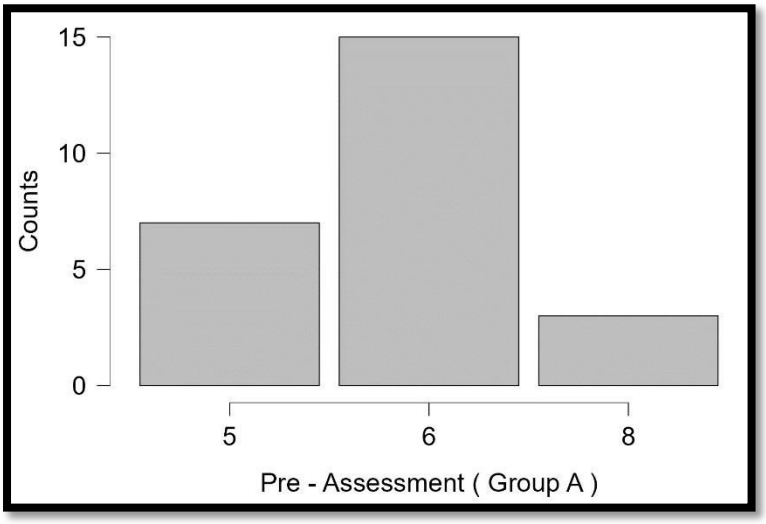

Figure 1b - Distribution Plots [Pre - Assessment (Group B)]

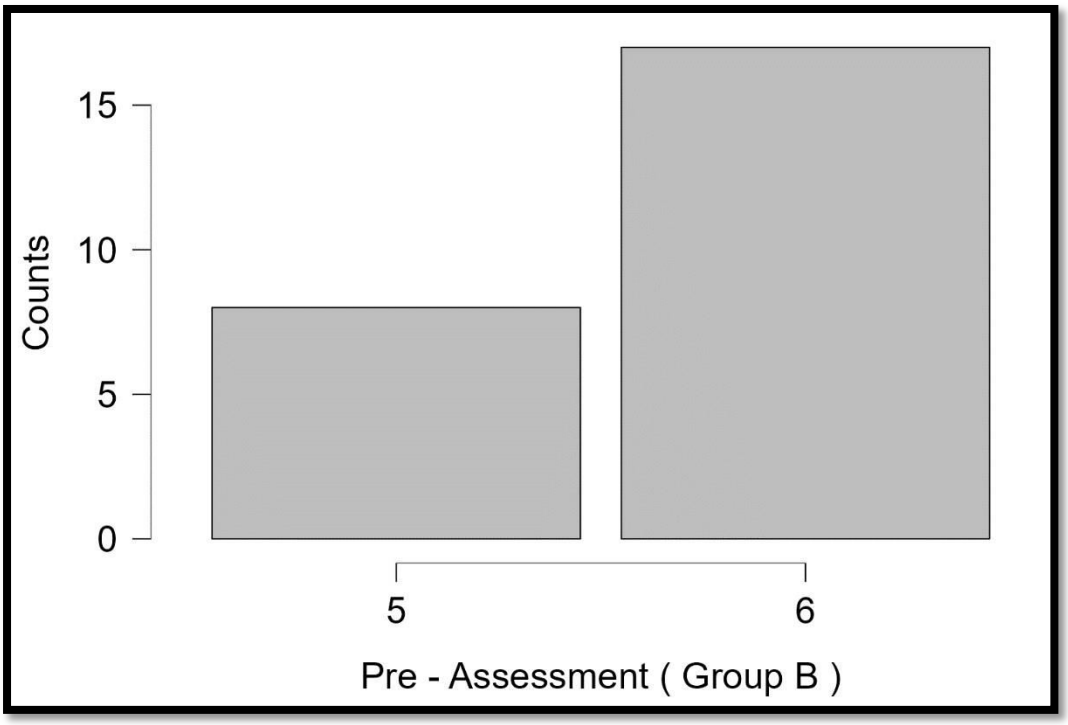

Figure 2a - Pareto Plots [Pre - Assessment (Group A)]

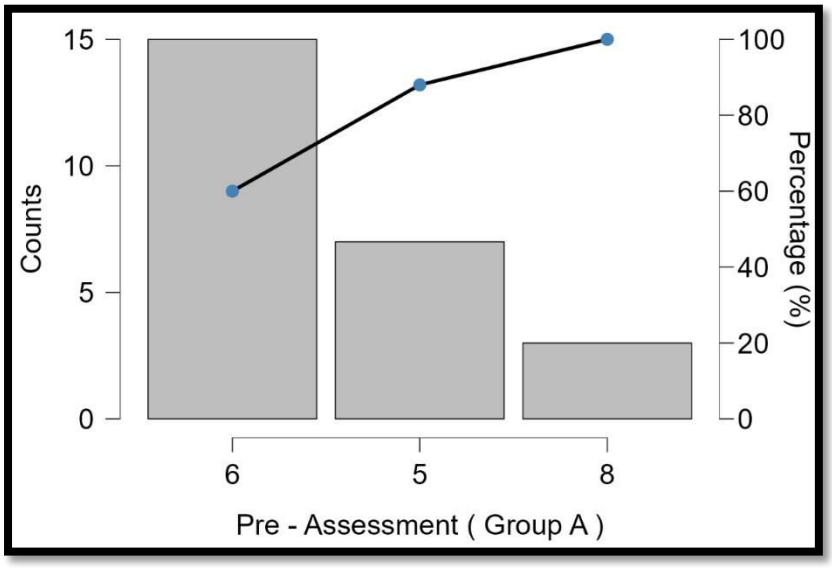

Figure 2b - Pareto Plots [Pre - Assessment (Group B)]

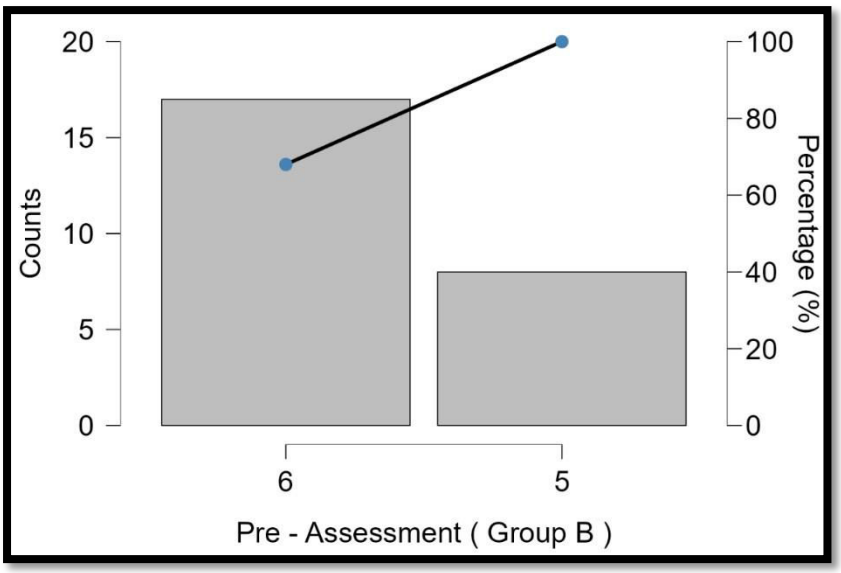

Figure 3a - Distribution Plots [Post Regular Assessment]

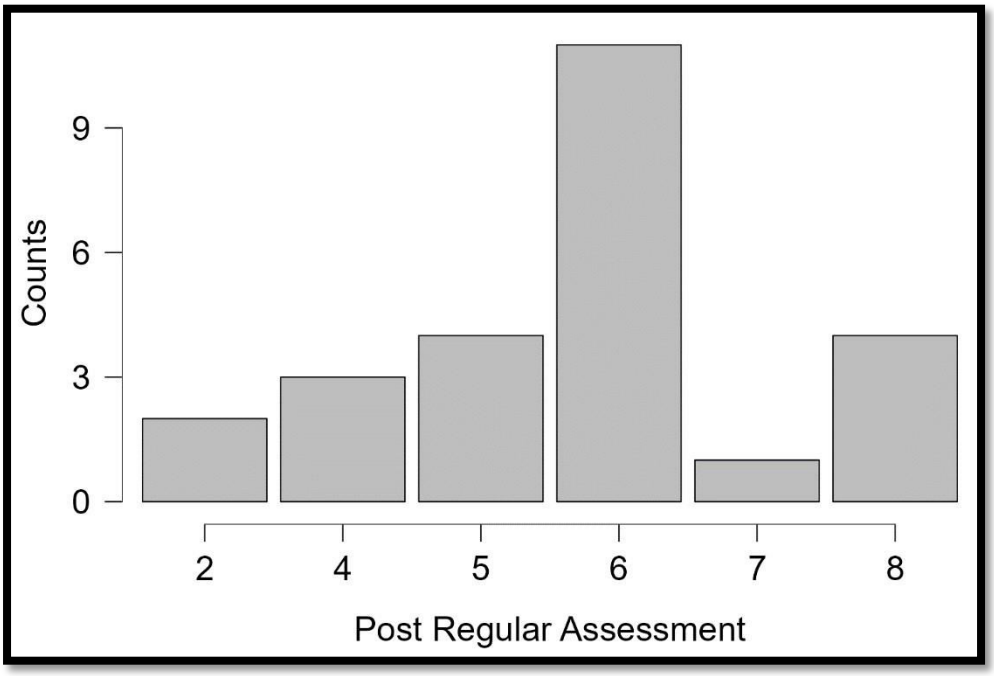

Figure 3b - Distribution Plots [Post Mind Mapping Assessment]

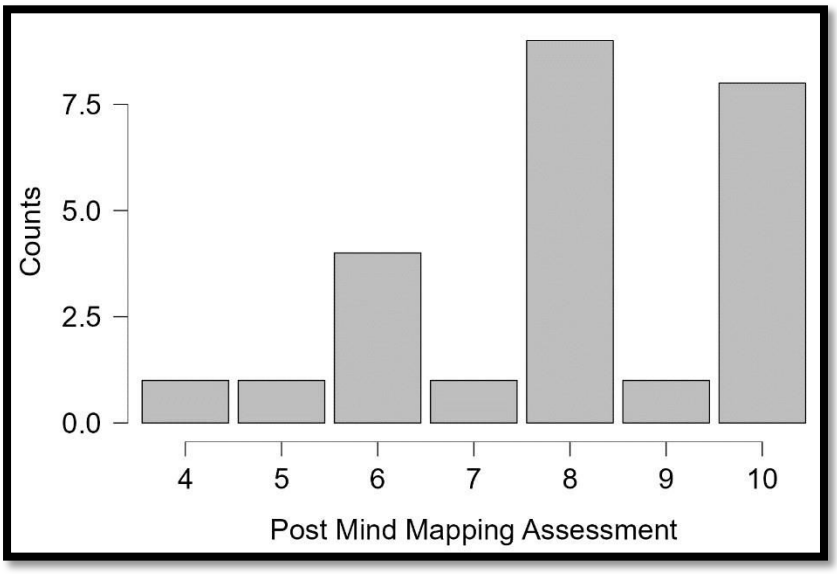

Figure 4a - Pareto Plots [Post Regular Assessment]

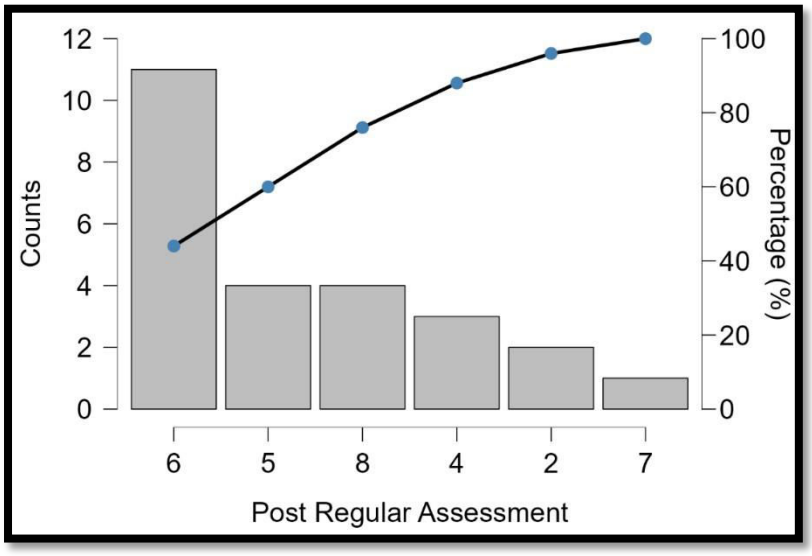

Figure 4b - Pareto Plots [Post Mind Mapping Assessment]

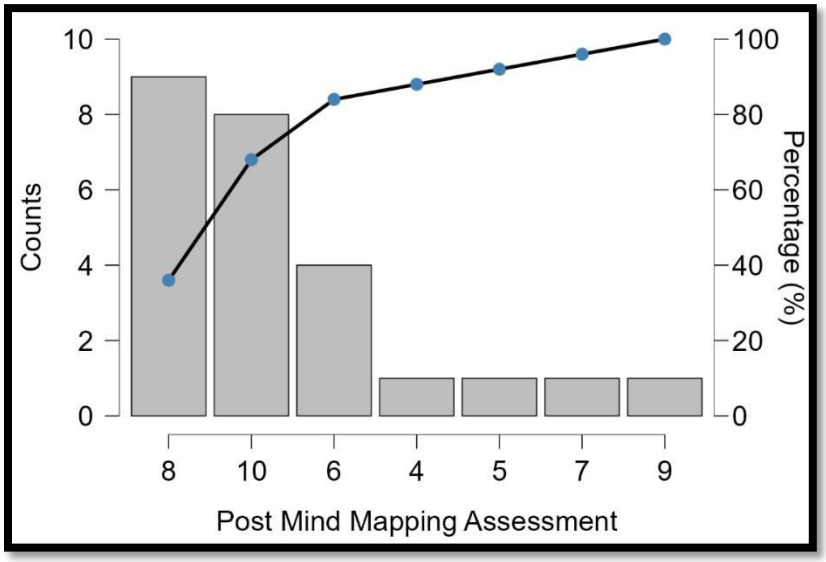

Figure 5 - Descriptive Plots

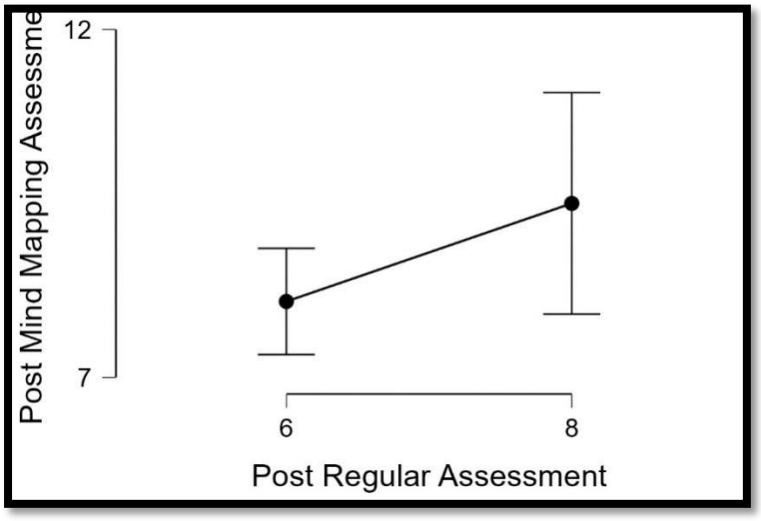

Figure 6 - Bar Plots

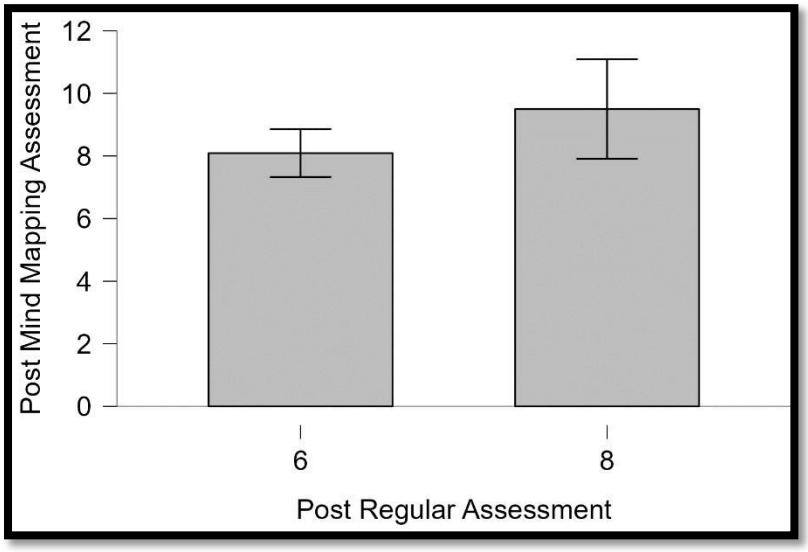

Table 1 – Descriptive Statistics of Group A and B		
	Pre - Assessment (Group A)	**Pre - Assessment (Group B)**
Mean	5.960	5.680
Std. Error of Mean	0.178	0.095
Std. Deviation	0.889	0.476
Coefficient of variation	0.149	0.084
Variance	0.790	0.227
Shapiro-Wilk	0.723	0.590
P-value of Shapiro-Wilk	< .001	< .001
Minimum	5.000	5.000
Maximum	8.000	6.000

Table 2a - Frequencies for Pre - Assessment (Group A)

Pre - Assessment (Group A)	Frequency	Percent	Valid Percent	Cumulative Percent
5	7	28.000	28.000	28.000
6	15	60.000	60.000	88.000
8	3	12.000	12.000	100.000
Missing	0	0.000		
Total	25	100.000		

Table 2b - Frequencies for Pre - Assessment (Group B)

Pre - Assessment (Group B)	Frequency	Percent	Valid Percent	Cumulative Percent
5	8	32.000	32.000	32.000
6	17	68.000	68.000	100.000

Table 2b - Frequencies for Pre - Assessment (Group B)

Pre - Assessment (Group B)	Frequency	Percent	Valid Percent	Cumulative Percent
Missing	0	0.000		
Total	25	100.000		

Table 3 - Descriptive Statistics of Post Evaluation

	Post Regular Assessment	Post Mind Mapping Assessment
Mean	5.640	8.040
Std. Error of Mean	0.321	0.353
Std. Deviation	1.604	1.767
Coefficient of variation	0.284	0.220
Variance	2.573	3.123
Shapiro-Wilk	0.889	0.877
P-value of Shapiro-Wilk	0.011	0.006
Minimum	2.000	4.000
Maximum	8.000	10.000

Table 4a - Frequencies for Post Regular Assessment

Post Regular Assessment	Frequency	Percent	Valid Percent	Cumulative Percent
2	2	8.000	8.000	8.000
4	3	12.000	12.000	20.000
5	4	16.000	16.000	36.000
6	11	44.000	44.000	80.000

Table 4a - Frequencies for Post Regular Assessment

Post Regular Assessment	Frequency	Percent	Valid Percent	Cumulative Percent
7	1	4.000	4.000	84.000
8	4	16.000	16.000	100.000
Missing	0	0.000		
Total	25	100.000		

Table 4b - Frequencies for Post Mind Mapping Assessment

Post Mind Mapping Assessment	Frequency	Percent	Valid Percent	Cumulative Percent
4	1	4.000	4.000	4.000
5	1	4.000	4.000	8.000
6	4	16.000	16.000	24.000
7	1	4.000	4.000	28.000
8	9	36.000	36.000	64.000
9	1	4.000	4.000	68.000
10	8	32.000	32.000	100.000
Missing	0	0.000		
Total	25	100.000		

Table 5 - Chi-Squared Test

	Value	df	p	VS-MPR*
X^2	64.094	30	< .001	157.596
X^2 continuity correction	64.094	30	< .001	157.596

Table 5 - Chi-Squared Test

	Value	**df**	**p**	**VS-MPR***
Likelihood ratio	38.705	30	0.132	1.374
N	25			

* Vovk-Sellke Maximum *p* -Ratio: Based the *p* -value, the maximum possible odds in favor of H_1 over H_0 equals 1/(-e *p* log(*p*)) for $p \leq .37$ (Sellke, Bayarri, & Berger, 2001).

Table 6 - Independent Samples T-Test

	W	df	p
Post Mind Mapping Assessment	6.500		0.045

Note. Mann-Whitney U test.