

MILA in Teaching Prosthodontics

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Abstract--- Traditional dental undergraduate education engages students in laboratory and classroom settings during the first two years of their preclinical training, with the clinical subjects being introduced in the third and final year, followed by one year of rotatory internship. Prosthodontics is an extensive subject, with learning beginning right from the time the undergraduate student joins the course till the completion of undergraduation. An effort to probe into the difficulties faced by the students in learning prosthodontics has been made and identified areas of difficulties have been selected so that suitable remedial measures could be recommended and if feasible tested with Multiple interactive learning algorithm as a combined effort from the Faculty of Prosthodontics, Saveetha dental

college. MILA makes a real difference when compared to the traditional method of chalk and talk lectures that sounds not very interesting with lectures scheduled during the afternoon sessions when the students felt drowsy. The article shares the outcomes of teaching prosthodontics with Multiple interactive learning algorithm in Preclinical prosthodontics-Denture teeth arrangement, RPD design, Impressions in complete denture treatment, Tooth preparation, Die systems, Failures in FPD, Basic implantology, practice management among slow learners, suturing techniques in implantology among UG and PG students. The results of prosthodontic learning outcome using MILA based on students performance after each teaching model with MILA is displayed in this article. The outcomes have been satisfactory. MILA in teaching Prosthodontics has revolutionized the way teaching can be constructed to move forward the younger generation to new thinking.

Keywords--- Multiple Interactive Learning Algorithm, Prosthodontics, Complete Denture, Implantology, POGIL, CAT.

INTRODUCTION

The Prosthodontics clinical course aims to teach students not only the importance of replacing oral structures but to stress preservation and optimization of the supporting structures through a combined effort with the other dental specialties. Students are exposed to the philosophies and principles of prosthodontics treatment with fixed, removable, implant, and maxillofacial prosthodontics. Teaching as well as learning prosthodontics constitute a major concern among both learners and teachers. MILA is educational process which involves multiple method of learning which can be customized to individual students based on their aptitude and acumen. Multiple interactive learning tools used in prosthodontics include CAT, POGIL, pedagogy lectures, flipped class, problem based learning, video based learning, evidence based learning, critical appraisal, competition based learning, simulation training along with clinical training. It was hypothesised that A high learning outcome was achieved with multiple interactive learning algorithm which enhanced the students in their area of interest in prosthodontics. Accordingly multiple interactive learning tools were applied in teaching prosthodontics among the 1st 2nd and 4th year students of undergraduate curriculum and year 1,2,3 students of postgraduate curriculum. The objective of this research was to analyse, display and share the results of prosthodontic course learning outcome using MILA and students performance after each teaching model with MILA.

MILA in Teaching Pre-Clinical Prosthodontics- Removable Prosthodontics

Introducing the 1st year students to Pre-Clinical prosthodontics laboratory Exercises & Concepts. Being a novice it is very difficult for 1st year graduate students to understand and learn the Pre-Clinical works, to visualise the outcome of their lab works they do and to correlate the theoretical lectures & Practical demonstrations with clinical perspective.[1]

Any demonstrations using videos & small group discussions will augment the faster learning process by the students. This method of teaching is required as the students are working in the laboratory, doing the lab works which are intended for the purpose of the patient, it will be difficult for the student to know the clinical use and correlate with the works they do in the lab in the absence of the patient. It is also important to improve the manual dexterity for the students at the same time.[2]

To overcome these difficulties faced by the students to understand the concepts and improve the work efficiency a protocol was introduced for Small Group learning by segregating 100 students into 6 small batches, each batch comprising about 16 – 17 students. In 1st year the students are required to do laboratory steps for Complete Denture, Removable Partial Denture and Cap-Splint. The complete Denture Exercise includes the fabrication of the Occlusal Rims & Mounting of the Casts in the Articulator. To understand the purpose of the Occlusal Rims & Articulator a

series of video based demonstrations were used to make them understand the procedures involved both clinically and in the laboratory. Also the students were made to observe their seniors in the clinics how they do the Jaw Relations which make them understand the clinical procedures involved. Then a video based demonstration of the jaw and its movements were shown followed by focused group discussions about 3 -4 students in a group where the subjective simulation by themselves were done & correlating these jaw movements in the semi - adjustable articulator which made a better understanding and visualisation of the procedures they do in the Pre-Clinical laboratory.

Video based Demonstrations -> Clinical Exposure -> Subjective Simulation -> Increased performance & Dexterity

It is very important to explore the students' difficulty in understanding the concepts, for this purpose feedback could be a good resource to know the difficulties faced by the students. The students were asked to provide feedback on the protocol and few more inclusions were made in the feedback form to know the perception of students towards the work environment and the teaching methods, where a majority of responses were positively given. (fig 1,2,3,4,5,6,7). This method of teaching is very effective in Pre-Clinical laboratory as it enhances the students focus in learning the objectives & improved performance of each student in completion of the pre-clinical exercises.

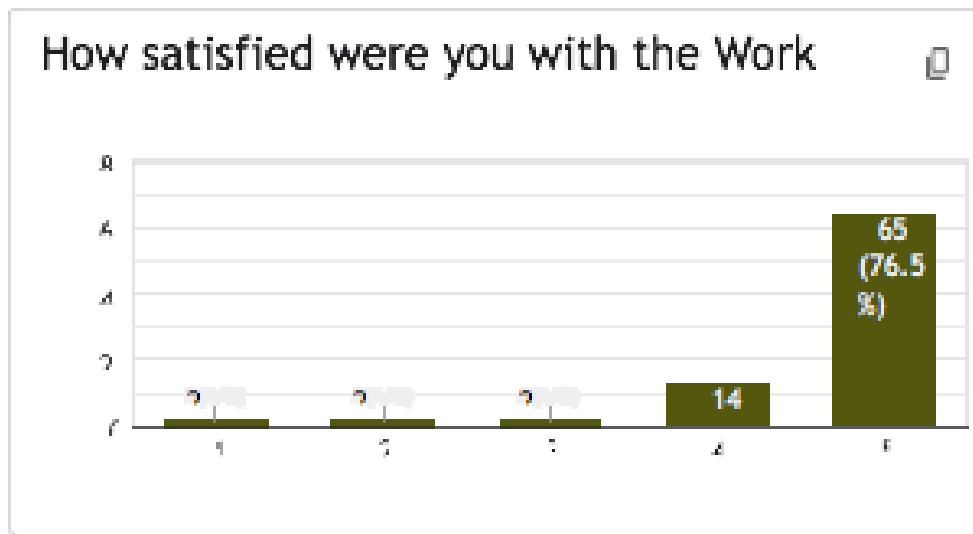


Fig. 1: Bar Chart Showing Response Scores of Participants in the X Axis and Number of Participants in Y Axis

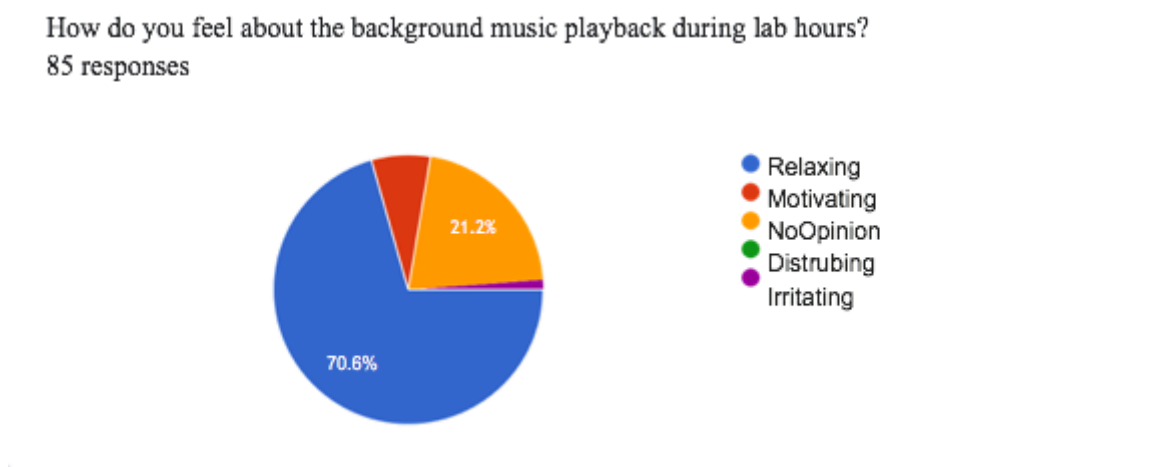


Fig. 2: Pie Chart Displaying the Responses of Students

85 responses

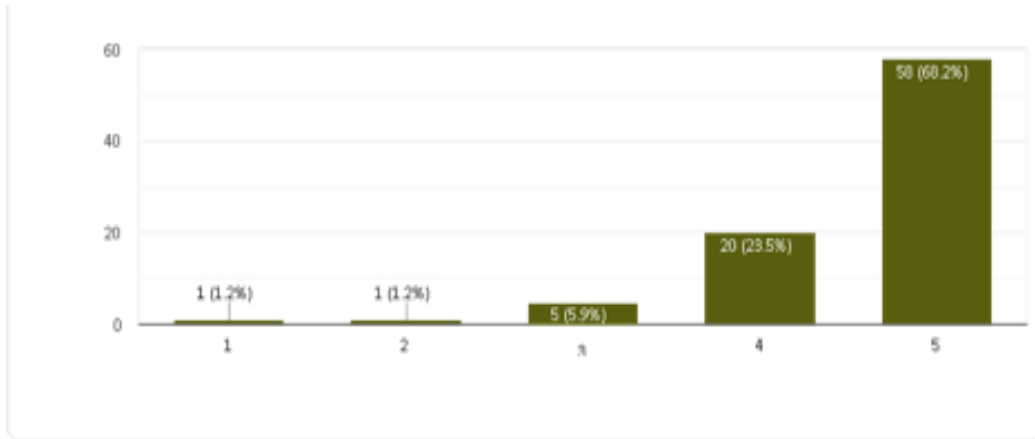


Fig. 3: Responses to the Question: How Relevant do you think the Method of Teaching Helps you to Complete Your Work?

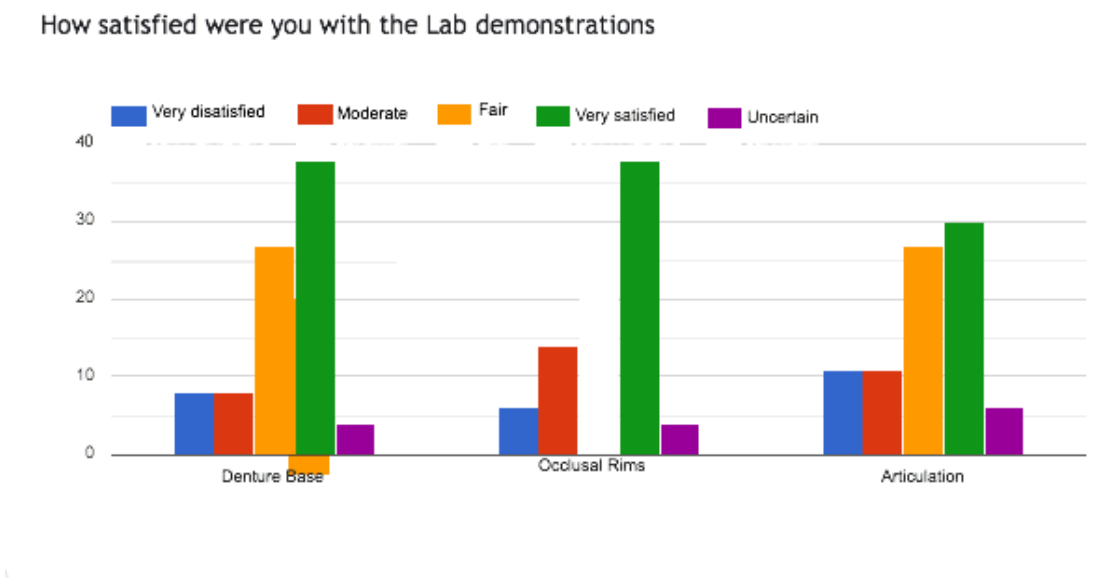


Fig. 4: Students Feedback on Denture Base, Occlusal Rims, Articulation Demonstrations

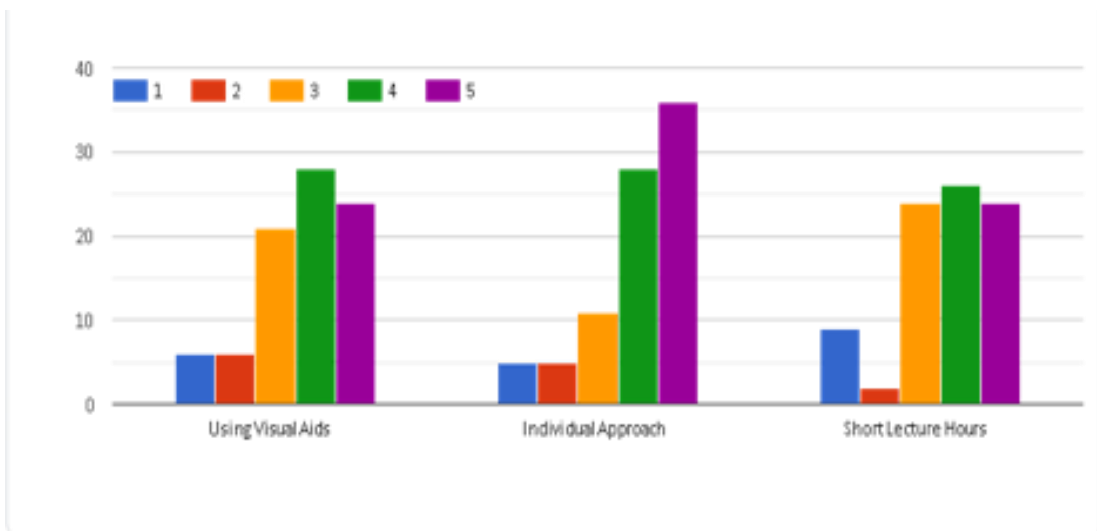


Fig. 5: Student Feedback on Most Relevant Sessions

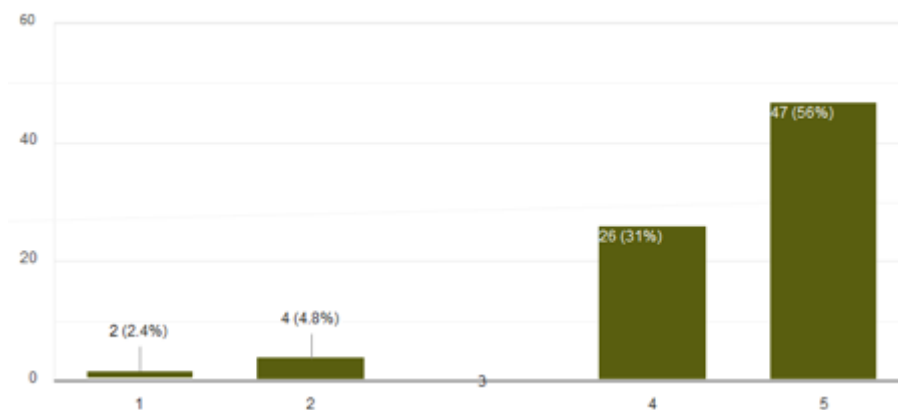


Fig. 6: Student Feedback on Level of Understanding the Use and Purpose of Articulator after Theory Session.

MILA in Teaching Preclinical Prosthodontics - Denture Teeth Arrangement

Preclinical Denture Teeth Arrangement is a very complicated concept. Students have difficulty in understanding practical concepts such as Arch form, Symmetry, Plane, Occlusal Contact relations, Occlusal Scheme and Aesthetic appearance in addition to identification of tooth form and anatomy.

Difficulty in teeth arrangement exercises have been widely reported in multitudes of publications across the entire dental education fraternity and is considered a source of consternation for predoctoral students and faculty alike. [1], [3].

We utilised a combination of “Video based Learning, Small Group Learning, Flipped Class and Structured Drills” method of pedagogy in a class between 9.00 AM to 12.00 Noon.

The Protocol included segregation of a total number of 42 students into batches of 13 students each (Small Group Learning). Each batch was subjected to a conventional teeth setting exercise in order to determine their aptitude and dexterity in teeth arrangement. The teeth arrangement principles and methods were taught to the students earlier during the 1st year of their program. A revision class was conducted prior to the teeth arrangement exercise. The exercises were graded upon completion. The students were then provided a custom designed video (Video based Learning) depicting the ideal appearance of teeth arrangement and were instructed to view the video on the eve of their scheduled exercise (Flipped Class). They were also encouraged to pause and watch individual frames of the video during the exercise. Upon completion, the exercises were graded once again. The evaluation was broken down into Arch form, Symmetry, Plane, Contact relation & Aesthetics and was individually scored. The students were informed of the structured scoring pattern prior to both exercises (Structured Drills).

The results indicate a significant difference between the scores obtained in the pre- and post-video based sessions. The post-video session scores were found to be significantly higher compared to the pre- video scores. The students were asked to provide feedback on the new protocol to which a uniform positive response favouring the video based session was obtained. There was at least one student per batch who requested monitoring even with the video playback during the arrangement. Even with such incidents, all students reported lesser frustration levels due to the visual aid from the video and heightened satisfaction upon completion of their practical exercise.

The 2 Supervising faculty have also observed a reduced need for physical monitoring as well as a lesser number of errors per teeth setting made by each student.

We would like to conclude stating the protocol proposed above has the potential to drastically enhance teeth arrangement skills among predoctoral dental students as observed by the results obtained during real time

implementation. We would also like to point out that the session was carried out on a small group of students; Even with that limitation, the wide difference in results indicate a positive effect of this protocol irrespective of the individual skill of the student.

Overall, we believe teaching students by this method is highly effective for teaching Preclinical Teeth Arrangement and advocate the implementation of this technique to other preclinical disciplines and in other institutions as well.

MILA in Teaching Impression in Complete Denture

Posterior palatal seal in complete denture impression seems to be a simple topic. But understanding the posterior palatal seal is a little difficult to understand. Understanding the anterior vibrating line and the posterior vibrating line in the posterior palatal seal area is quite confusing.

This has been widely reported in various publications.[4] [5].

We utilised Group discussion method of pedagogy in a class between 8am to 10am. The protocol included dividing the students into three groups and each group identified the anterior vibrating line, posterior vibrating line, hamular notch in the cast and they acted like the advantages of recording posterior palatal seal, the effects of overextended and under extended denture margins. The next activity the students did was identification of the anterior and posterior vibrating line and marked using the haematoxylin pencil. Impression done cast poured and verified with the replication drawn in the mouth.

The students after group discussion and visual search among themselves made them understand the concept better and confident enough in doing their impressions in complete denture patients that had the recordings of anterior and posterior vibrating lines. This technique not only understands the students recording the theory of posterior palatal seal but also guides the students to record the posterior palatal seal in the completely edentulous patients in the clinics that aids in better retention with good posterior seal. Patients are also satisfied with the dentures made by the undergraduates with good posterior seal area. Post insertion complaints are very less after students understand the concept. Overall we believe that the group discussion and the visual examination with self-finding teaching methods are very effective both theoretically and clinically useful for both students as well as patients.

MILA in Teaching Removable Partial Dentures

Removable Partial denture topic as a whole is a difficult concept for the undergraduates to understand. Prosthodontics subject as a whole revolves around incorporating mechanical rigid components into biological hard and soft tissues, when it comes to Removable prosthesis especially this partial denture creates a lot of challenge in why it's being done in this particular way.

Students have difficulty in understanding the components used, biomechanical principles, impression recording techniques and final prosthesis construction. These specific difficulties have been reported in literature and associated prosthetic construction failures.

We incorporated POGIL and playful show tell do method of pedagogy between the regular oral theory sessions. These concepts were intertwined between theory classes which focuses on how to break down the bigger concepts and relate to everyday activities. In the playful show, students were given simple scales, rubbers and other stationeries to make a childhood game of seesaw. In this playful activity effort, fulcrum, load concepts were demonstrated with different lever principles and how these were correlating to the removable Partial denture

components. This playful show tell do activity made students understand the biomechanics in a bigger picture and how different prosthetic components helps in stabilisation.

In process oriented guided interactive learning (POGIL) students will be given key words related to the theory topics covered and they have to do literature search on those keywords. The literature search will be done electronically in pubmed, scopus search engines and relevant documents will be retrieved and each student reads those manuscripts. Each student then will summarise in the shortest possible way about the article they read and how it is relaxant to the theory class covered. When students interact about the new learnings from the literature students tend to grasp the subject better and clarify doubts about the subject then and there. This method was employed in teaching the topic- impression procedure for removable Partial dentures and Students could actually differentiate different techniques once the class was over.

These activity based learning has made big differences in student learning outcomes. The pass percentage in the particular subject-prosthodontics has gone up to 99 %, during clinical exams too the students ability to answer confidently was appreciated by external examiners. When a case based discussion was given to the students they were able to hit the bullseye of getting a treatment plan with various Removable prosthesis designs.

To conclude MILA in teaching has revolutionized the way teaching can be constructed and move forward the younger generation to new thinking.

MILA in Teaching Removable Partial Denture Design

The theory of Partial Denture Design is quite a complicated concept and difficult to understand for undergraduates students in prosthodontics. Students have difficulty in understanding the section of diagnosis, classification, R.P.D design, fabrication and treatment plan. These have been reported in various publications [6][7] [8].

We utilized the method of POGIL (Process oriented guided interactive learning), Small Group Case Based Discussion, Video based learning and Flipped class in theory classes.

The protocol included splitting the students into various small groups. (POGIL) Interrelated topics we gave as discussion topics for separate groups. Each student of the group will be well versed in the topic. Students were motivated to collect information on this topic from various sources including their journals, textbook and the web. The groups are then reshuffled so that the new group has one member of each group. They were shared and discussed amongst their new group members of information and the content absorbed and learned. This was conducted as a session of 20 minutes lecture followed by the activity for the period of 20 minutes, which will be related to the 20 minutes lecture to improve the thinking and increase the retention skills. (Small Group Case Based Discussion) The class was divided into small groups, each group consisted of six students. Cases were selected from the patient's records and distributed among each student group. They were discussing the treatment planning and then providing one solution for the case. Video based learning (Flipped class) we were provided the pre-recorded video of the class representing the appearance of R.P.D design and concepts. They were instructed to view the video and help in easy understanding the concept as well as open more paths for discussion.

Multiple teaching methods were beneficial for the students. There has been a dramatic increase in understanding the concepts in relation to removable partial denture design in Prosthodontics. As well as, the students were able to identify the classification, draw the design and label the component parts of Removable partial denture. Students were able to understand the concepts right away. Students were able to rationalize the diagnosis and treatment plan. They updated the recent concept and also understood the existing debates.

To conclude that, I believe teaching this type of Multiple Interacting Learning Algorithm methods as a main approach to teachers to ameliorate the learning outcome for the undergraduate students and the possibility for immediate reach any type of student learning's preference.

MILA in Teaching Principles of Tooth Preparation

MILA in teaching Principles of tooth preparation is a relatively challenging and complicated.

Practice involving both art and science. The influence of preparation design on the quality of tooth preparation in dental education is well known. Understanding the concepts is necessary to design and execute the plan. This has been cited by several authors.

Students have difficulty in understanding concepts and applying it in clinical practice. Initially we had a Conventional classroom teaching lecture for an hour on principles of tooth preparation after which students had to design and prepare teeth for a three unit fixed prosthesis. They were graded on completion based on treatment plan, design and execution of principles of tooth preparation.

We then used a combination of flipped class method (digital interactive learning) and small group learning of pedagogy in a class between 9 and 11 am. The protocol included preparation of a flipped class with concept mapping. Students were instructed to view and understand the contents prior to the scheduled class. After the scheduled class, students were divided into five groups based on headings in concept mapping. The five topics under this concept mapping were discussed with diagrams by students Within and between groups. After the scheduled group discussion, students were asked to design and prepare teeth for a three unit fixed prostheses. They were graded accordingly.

When the scores were compared there was a dramatic improvement in the quality of tooth preparation, after the flipped class teaching method. Students were able to apply the theoretical concepts to practice with ease and confidence. The time taken was less, preparations had a path of insertion, bevels for structural durability, features for retention and resistance with good margins.

Overall we do believe that training and motivating students in this method is very effective for teaching principles of tooth preparation in clinical scenarios in fixed prosthodontics. It enhanced their knowledge, skill, dexterity and confidence relatively easily.

MILA in Teaching Die Systems

MILA in teaching: Various die systems used in Metal ceramic and All ceramic technology, compositions and their method of fabrication.

It seems to be an easy topic but the most confusing and easily evaporating topic from memory. Post Graduate Students have difficulty in understanding each concept without having knowledge of demonstration on each technique of fabrication.

The Protocol Included

We utilised and started with the basic book reading session from standard books meant for these topics and discussed in a classroom. I followed this approach since I observed little or no practice from students in reading these textbooks. Book reading has got direct and indirect advantages such as for writing fill in the blanks for the exam and improving their depth of knowledge...etc I Encouraged students to get actively involved in book reading sessions on recommended text books (fig 8,9) on these subjects/topics.

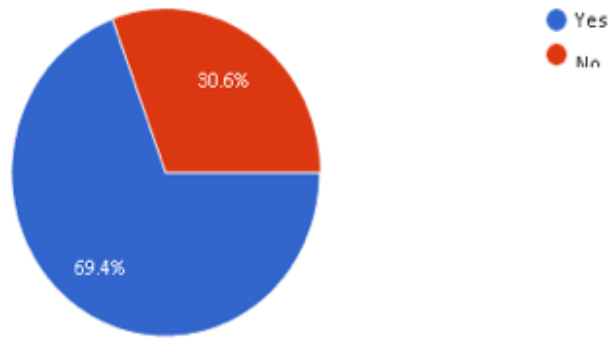


Fig. 7: Feedback on Adequacy of Working Hours for Work Completion



Fig. 8: Book Reading Session Followed by Individual Presentations

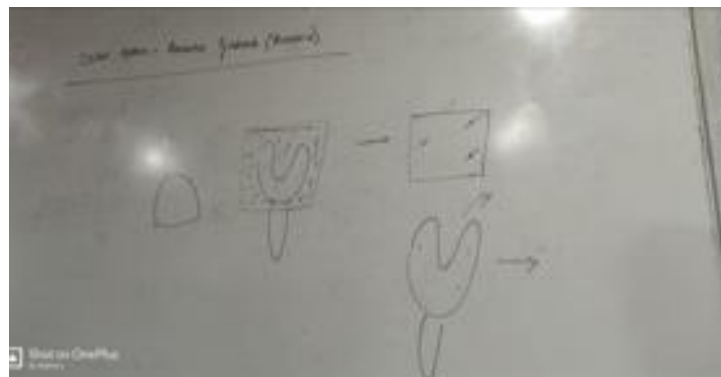


Fig. 9: Individual Presentations

This once again was followed by individual presentation by students on assigned topics by class room teaching pedagogy method. (fig 10) in a class. At the end of the pedagogy Class each of them were asked about questions related to,

1. Importance of doing precise die cutting
2. Normal contacts and contours
3. Consequences of improper Die cutting
4. Consequences of improperly contoured Crowns and periodontal problems

Coming on to the methods of fabrication they were asked to watch flipped Class with youtube videos (Video based learning) since they are not in touch with conventional method of fabrication...(they Follow digital CAD CAM method for fabricating all ceramic crowns and bridges) Followed by 5 minutes question session regarding.

1. The success and failure in all ceramic restoration
2. Importance of proper fabrication method
3. Composition of each material
4. Bonding mechanism involved
5. Ceramic veneering techniques

This was such a satisfying method of teaching among all methods I believe as far as the post graduates are concerned. I conducted a quiz program with a timer, whoever answers first within the expected time period they are announced as the winner and they will get a reward. This encourages them to give excellent responses and attention in a classroom. While giving marks I analysed them in 5 categories such as,

1. Those who are able to understand theory much and explain in a much better way
2. Those who are interestingly involved in explaining difficult part to others
3. Those who have knowledge of searching in good indexed journal (pogil search)
4. Those who are covering all important points from multiple text books and other sources available (Google)

After this practice they are able to understand the mistakes which have been made by laboratory fabrication and are able to instruct them to do corrections if needed.

I have spoken to the tessellation centre saveetha dental college regarding the demonstration based learning for the above mentioned same topic for their final and finer understanding. Initially when I took class by Conventional method they didn't have much interest in listening and from the postgraduate point of view everyone will have understanding capacity but they lack listening capacity and interest towards learning and there were also no improvement in scoring marks in the weekly test. So to motivate them I have started a new methodology of teaching which includes starting from,

1. Book reading in standard recommended text books (helpful in writing fill in the blanks)
2. Flipped class and you tube videos (video based learning)
3. Writing concept mapping at the end of book reading
4. Classroom pedagogy (main method along with Pogil search)
5. Demonstration based learning (saveetha tessellation centre)
6. Quiz Program with timer

Students are happy now as it eliminated the fear and improved their confidence level, vocabulary, knowledge and memory power.. etc..

There has been a dramatic increase in their performance after the implementation of this method, which improved their interest towards listening to the classes, and there has been a dramatic increase in their presence to college. (Absent percentage drastically reduced).

Overall, i believe teaching Post Graduate students by this method is effective for teaching Various Die systems used in metal ceramic and All ceramic restorations and their method of fabrication.

MILA in Teaching Failures in FPD

It is always a quiet challenging job for the students to understand the complex clinical or practical situations in the theory books, so we have adopted the MILA system to make the students in interactive in every aspects of learning

and understanding the concept by various approaches like video, group discussion and friendly approach through easing the students to approach faculty easily. Clinically applied teaching helps the students the most ways. Above all, a good teacher role is not only teaching the subject but also teaching life and philosophy which directly or indirectly helps in connecting or handling clinical skills more skilfully.

The Protocol Included

We utilised and started with the short 15min theory session with the slide share from standard books meant for these topics and discussed in a classroom. Followed this approach since I observed little or no practice from students in listening to the class. Textbook gazing was advised for the students, this has got direct and indirect advantage such as for writing fill in the blanks for the exam and improving their depth of knowledge...etc I Encouraged students to get actively involved in book reading gazing session on recommended text books (1)(2) on these subjects/topics.

At the end of Class and discussion each of them were asked about questions related to,

1. Cementation failure
2. Mechanical failure
3. Biological failure

Coming on to the methods of Diagnosis they were asked to watch flipped Class with youtube videos (Video based learning) (various failures in FPD) Followed by 5 minutes question session regarding,

1. The success and failure in all ceramic restoration
2. Importance of proper fabrication method
3. Bonding mechanism involved.
4. Ceramic veneering techniques

Following any of the old patients is recalled in the clinics side by the seminar itself and directly the FPD failures are addressed and appointment patients with FPD failures were treated by one of the students assisting by myself. This makes the student feel more confident in handling the patients with their sound theory background by direct clinical application.

This was such a satisfying method of teaching among all methods I believe as far as the post graduates or undergraduates concerned. They need a teacher whom they can trust on along with many different orientations of teaching methods that are not monotonous for them. This encourages them to give excellent response and attention in a class.

Finally I gave a self assessment short exam with them to students.

While giving marks I analysed them in 5 categories such as,

1. Those who are able to understand theory much and explain in a much better way
2. Those who are interestingly involved in explaining difficult part to others
3. Those who have knowledge of searching in good indexed journal (pogil search)
4. Those who are covering all important points from multiple text books and other sources available (Google)

After this practice they are able to understand the mistakes by themselves and feel more confident and motivated on managing the clinical cases using their theory applied knowledge.

I have myself started assisting the students in saveetha dental college regarding the demonstration based learning for the above mentioned same topic for their final and finer understanding. Initially when I took class by Conventional method they didn't have much interest in listening, they lack listening capacity and interest towards

learning and there were also no improvement in scoring marks in the weekly test. So to motivate them I have started a new methodology of teaching which includes starting from,

1. Book gazing in standard recommended text books (helpful in writing fill in the blanks)
2. Flipped class and you tube videos (video based learning)
3. Writing concept mapping at the end of book gazing
4. Classroom pedagogy (main method along with Pogil search)
5. Demonstration based learning (Clinical cases)
6. Spending time with the students leisurely
7. Attend conferences and other academic activities with them

Students are happy now as it eliminated the fear and improved their confidence level, vocabulary, knowledge and above all to approach the faculty anytime.. etc

There has been a dramatic increase in their performance after the implementation of this method, which improved their interest towards listening to the classes, and there has been a dramatic increase in their presence to college. (Absent percentage drastically reduced).

MILA in Teaching Basic Implantology

Learning the Basic implantology for undergraduate students is quite challenging. Students have difficulty in understanding the subject at undergraduate level, and placement of implants in undergraduate level.

We utilised video based learning as a method in class between the modules, which happened for one week. The protocol included classes shown through video which were played twice, followed by activity.

There has been a dramatic increase from the conventional lecture classes when compared. Overall, we believe teaching students by this method is effective in learning basic implantology.

Topic: Video based training for Final year Implantology Module No. Of Students: 75 (2018)

90 (2019) 30 (2020) Materials and Method

Source: Video which was made on that particular topic were played twice

Activity: Different activity after each video class

Duration: 5 days of comprehensive learning module

Topics: History of implantology, design, diagnosis and treatment planning, osseointegration, grafting procedures, placement, treatment options, success and survival.

Students Review

1. Visualising and learning the practical
2. Activities were more practical

Summary Video based teaching was conducted for the final year implant module every year. Students seem to be more attentive than regular board classes. The knowledge transfer was much better when compared to conventional. The students were able to visualise the concepts of implantology through this and understood the topic better. When in doubt the videos were stopped in-between and further explanation was provided. The activities given at the end of the session were more practical and the students were able to relate the classes well. The E- Learning was more effective, engaging and the training approach for placing implants was much easier.

MILA in Teaching Implantology

The use of dental implants for treating complete or partial edentulism is a widely accepted treatment option as a result of its high success rate, it is imperative that the undergraduate dental students receive sufficient training about implant treatment modalities so that they can give knowledge to the patients about implant therapy and its advantages. Since the patient is seen and treated by the undergraduate students first and then referred to the postgraduate departments for further advanced treatments, it is essential for an undergraduate student to learn all the modalities of treatment for a missing tooth and treat the patients within their limitations. In this regard teaching Implantology for undergraduate students is important as Implant based treatments have become usual within dental practices and Dental colleges are responsible for providing students training in theory and in practical skills. Our college is the first college in the country to introduce Implantology as a subject in the main curriculum for the undergraduate students from 2011 and at that point it was important for us to simplify the contents to undergraduate level so that the students can learn the topics with more confidence and MILA Teaching methodology was so handy in making the students learn implantology at ease. MILA is a teaching methodology where short lectures are interspersed with different activities that will facilitate a simpler, easier and fun filled learning experience for the students. In comparison with conventional lectures where it is very difficult to retain student's attention, the MILA concept keeps the student active throughout the lecture time and since the students are divided into small groups for activities, the facilitator can give individual attention to the students.

Protocol Followed

1. Flipped Class: The entire topics to be taught is done into short videos of not more than 3 mins and this material is introduced to the students before attending the class and the classroom time is used to discuss the topic with peers and teachers in depth thereby making learning more active in comparison to conventional teaching where the learning is considered to be passive. The following topics were made into Flipped class videos.
 1. Introduction to Implants - History, Evolution and Types of implants
 2. Implant design
 3. Diagnosis and treatment planning
 4. Osseointegration
 5. Implant surgical and Prosthetic components
 6. Protocol and Guidelines for placing and loading implants
 7. Impression making
 8. Fabrication of Simple and Complex implant prosthesis
 9. Implant Occlusion
 10. Bone Augmentation
 11. Implant complications and Failures
 12. Maintenance Protocol
1. Group Activities: Each flipped class session is followed by a group activity pertaining to that topic. Each group will have a faculty as facilitator who will guide the group for the activity. Activities like ZIGSAW, PLTL, CLAY MODELLING, MIND MAPPING were used.
 1. Introduction to Implants: The activity used for this topic is JIGSAW In this activity member from each group is picked and an expert group is formed and the main topic Introduction to implant was divided into sub-topics like History and Evolution, Types, Demography and Need for Implants, Current status of

Implant treatment in India, Market share of 5 big implant companies in India. The expert group will discuss and learn the sub topics and return to the home group, in the Home group each member will teach the peers what they learnt in the expert group.

2. Implant Design: The activity used for this topic is clay modelling, each group is asked to design implants of their own and the group leader will explain the design in detail and substantiate that with evidence. This activity will kindle the creativity in the students and the students enjoy doing this activity.
3. Diagnosis and Treatment planning: The activity used for this topic is Mind mapping which is a graphical way to represent ideas and concepts. It is a visual thinking tool that helps structuring information, the topic is divided into subtopics like Indications and contraindications, steps in CBCT planning, surgical guides, Recent advances and each group will make a mind map and share it with the other groups. This activity helps them to remember the topic very well.
4. Osseointegration: The activity used for this topic is Peer led team Learning (PLTL) in this activity students help themselves in understanding and learning concepts in the presence of a facilitator topics like Theories of osseointegration, Bone remodelling around implants, Methods to test osseointegration and failure of osseointegration are discussed.
5. Implant surgical and Prosthetic components: Activity used Mind Mapping.

MILA in Teaching Controversy in Immediate Implant Placement and Restoration

Critical appraisal of a topic is a compilation of existing evidence from systematic review to analyze and form a new informed opinion. Immediate implant is a very complicated concept. Students have difficulty in understanding protocols, consensus, complications, and outcomes. This has been widely reported in various publications [9][10].

We utilised CBL (Competition based learning) method of pedagogy in a class between 1pm to 3pm. Debate was utilized as a competition based learning (CBL) tool. The protocol included comparison of pre and post debate fill in the blanks test marks for 18 students from the same subject field on the particular topic- immediate implant in order to determine their aptitude and knowledge in the controversy of immediate implant. For the debate, the 18 students were segregated into two groups by random sampling. There were three rounds for the debate (CBL).

1. Firstly, they were establishing their points based on evidence.
2. Face to face round where they were fighting verbally with submission of evidence (published paper),
3. Thirdly, each of them were discussing their own understanding from the topic.

Then next day again test were conducted from the same topic in order to understand the outcome of the activity based learning i.e. CBL.

There has been a dramatic increase in learning skill, capacity of remembering the evidence, clear knowledge of the subject, understanding different ways of critical analysis.

This activity secession reinforced students' old concepts and gave way to newer ideas and also improved their knowledge to analyse high levels of evidence to improve clinical practice. Students were updated on current literature and improved their confidence in all clinical procedures they do. It helped them to defend themselves. This novel CBL activity triggered students' minds to apply intellectual ideas.

Overall, we believe teaching students by this method (CBL) is effective for teaching controversy in any field of dentistry based on literature and this is a fun, motivating, enlightening, innovating, brainstorming activity based learning.

MILA in Teaching Suturing Techniques in Implant Dentistry

Students have difficulty in understanding the suturing concepts that they study in books without practice. Difficulty in suturing exercises has been widely reported in multiple publications.[11][12][13] [14][15].

We utilised a combination of Small group interactive learning followed by Simulation method of pedagogy in a class between 1.30pm to 3.00pm. The protocol included small group learning of suture materials, knots and needles followed by demonstration of suturing techniques on a Duoderm CGF Extra minces model, orange rind.

The use of teaching models permits the students to handle the surgical instruments in a limited field under a semi-realistic circumstance and also helps in developing psychomotor skills.

A fresh orange is cut into two segments from top to bottom. The pulp of the fruit is carefully removed thereby separating it from the rind (fig 11,12)A thin layer of putty vinyl polysiloxane impression material is smeared on to the inner surface of the orange skin peel and the pulp space is filled with either plaster of paris. Subsequently, when the dental stone sets, the suture model is ready for use(fig 13) which can be sutured similar to tissue along the incision.(fig 14).[16].

Different suturing techniques were demonstrated to students and the same was simulated by the mentors on Duoderm models (fig: 15,16,17), orange rind following which the students were made to practise the same on models during class.



Fig. 10: Presentations after the Book Gazing, Book Reading Module

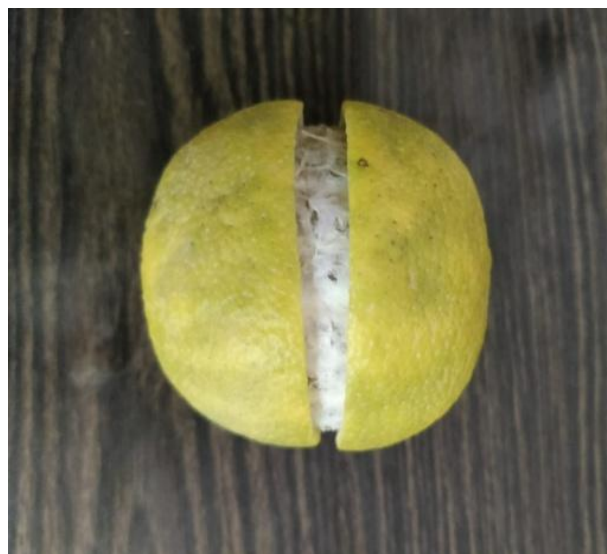


Fig. 11: A fresh Orange is Cut Into Two Segments from Top to Bottom



Fig. 12: The Pulp of the Fruit is Carefully Removed Thereby Separating it from the Rind



Fig. 13: The Suture Model is Ready for Use with Suturing Armamentarium



Fig. 14: Simulated Dental Suturing to Position

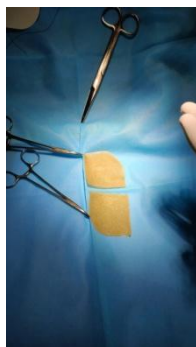


Fig. 15: Duoderm Models Ready for Suturing

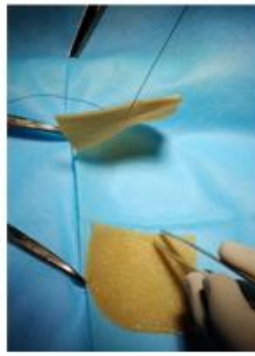


Fig. 16: Demonstration of Suturing on Duoderm by Mentors

There has been a dramatic increase in the attention of students when compared to regular class. Students better understood concepts of suturing of skin and mucosa.

The primary objective of dental suturing to position and secure surgical flaps were well understood by students. Optimal soft tissue healing for aesthetics depends on the clinician’s knowledge of and skill at executing proper suturing for optimal wound closure. [17]

Optimal choice of suture thread material, needle and knots not only eliminate the difficulties encountered during surgical closure but also decrease the potential for postoperative infections. [18]

Overall, we believe teaching students by this method is effective for teaching “Suturing techniques in implant dentistry” by enhancing psychomotor skills and tactile sensation among students practicing suturing techniques.

MILA in Teaching Practice Management

Undergraduate dental education is extremely unique as it involves not only academic knowledge, but also encompasses in it a knack to acquire clinical and interpersonal skills. For a dental student, the third year marks a very important year in their journey of becoming a dental surgeon. Entry into third year can be termed translational as the dental student first enters clinical practice and starts performing procedures on patients. This can be quite challenging and overwhelming for a budding dentist. Concepts such as patient conflict management, infection control and adherence to treatment protocols are difficult concepts. This has been widely reported in various publications. For example in the study published by Polychronopoulou et al 2009, it was observed that dental students from across the world unanimously agreed that their first clinical year was the most difficult year in the undergraduate period. A similar study published by Divaris K et al in 2008 also identified the overwhelming pressure of handling patients for the first time as the greatest stressor in their five years of undergraduate education.

We understood the need for a programme that basically helped students ease into clinical practice. We utilised Video based learning, Small Group Learning Problem based learning and Role play as a method of pedagogy in a weeklong intensive hands-on workshop that was held from 08:00 AM to 03:00PM. (fig 18)

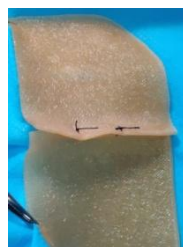


Fig. 17: Simulated Sutures on Duoderm Models



Fig. 18: Figure Demonstrating Small Group Learning Actively Mentored by Mentors

The Protocol included segregation of a total number of 80 students into 10 groups with 8 students each (Small Group Learning). Each group was then mentored by a faculty who would mentor them through different clinical concepts and hands on exercises.(fig 19) After a 20 minute didactic session, the faculty would then assign an activity for the whole group to participate in.(fig 20) The activity could be finding the solution to a problem (Problem Based Learning)(fig 21,22). The activity would then be assessed by the mentor faculty present in the group, who would also provide real time feedback on the outcome of the various activities performed by the student. Dr. MM House said that it was imperative for a clinician to meet the mind of the patient before meeting the mouth of the patient. To help students get a better understanding of this concept, we utilised Role play to enact different psychological patient profiles and ways to handle them. The videos (Video based learning) of different clinical procedures were played to students after which they were asked to perform (under supervision) the same in preclinical models. The procedures were assessed by the mentors and active real time feedback was shared with the students.



Fig. 19: Picture of a Mentor Demonstrating Procedures to Students



Fig. 20: Figure Displaying the Gingivectomy Activity Model for Activity between Didactic Sessions

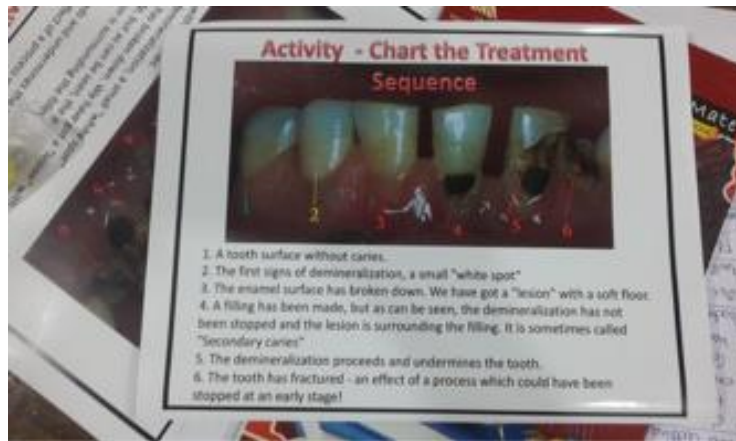


Fig. 21: Figure Displaying the Activity Cards Used in Module

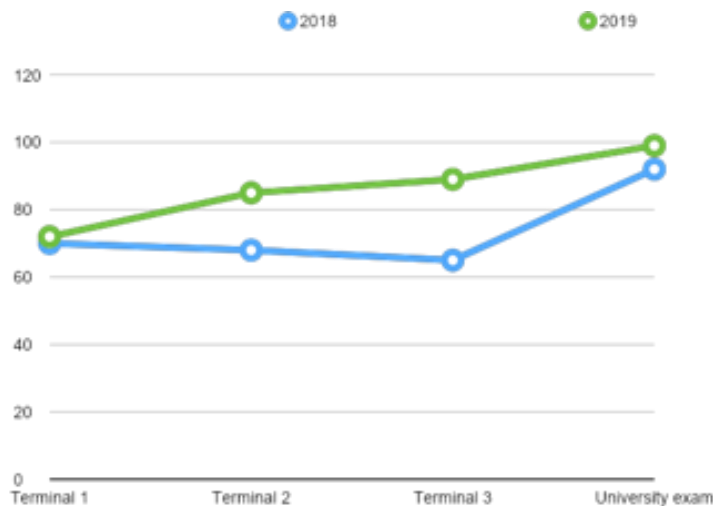


Fig. 22: Figure Displaying the Students Performance in Exams in Percentage

The students were then asked to provide feedback on the programme to which a uniform positive response was seen. The year end clinical performance was then assessed with the total number of procedures counted as the main variable. The average procedure count increased by 85% and improved the overall confidence level of the students. We also conducted a survey among students to check their perception towards the need for a practice management course in their undergraduate curriculum. The survey results showed that 97.7% of the student population agreed that the practice management programme should be inculcated in their curriculum.

Overall, we believe teaching students by this method is highly effective for teaching practice management to undergraduates and advocate the implementation of this technique in other institutions as well.

MILA in Teaching Educational Tool in Slow Learners

Students with below average cognitive abilities whom we cannot term as disabled are called slow learners. They struggle to cope with the traditional academic demands of the regular classroom. Actually slow learners are normal students but the problem is that they are simply not interested in studying under a traditionally accepted system of education. Slow learners should not be confused with students in need of special education or reluctant learners who are non-cooperative. A student may fail to excel in some classes or in some subjects but it does not imply that he or she is a slow learner. The teachers and guardians may resort to some of the teaching aids available to special education students that may enhance interest of slow learners and help them get involved in the learning process.

Students learn at different rates, and, according to some published research, students learn only when they are ready. Other research gives importance to intrinsic rewards, differentiated curriculum, and motivation by personalizing lessons. However, the bottom line for most educators is that some students are slow to learn, but do not have a learning deficiency. Perhaps the greatest challenge to an educator is a child who is a slow learner. These students do not fall into the category of special education, they do well outside the classroom, and show no evidence of having a medical problem. They simply do not do well in school or a particular subject. Slow Learners may have problems not only with math and reading but also with coordination such as penmanship, sports, or dressing. Often they are quiet and shy, and they have trouble making friends. They may have poor self confidence. They often have a short attention span. All of these problems cause them to have a poor self esteem.

In general, slow learning students may exhibit some or all of these characteristics, depending on their age and degree of problems acquiring knowledge at school. First, slow learners are recurrently immature in their relations with others and do poorly in school. Secondly, they cannot do multifaceted or complex problems and work very slowly. They lose track of time and cannot convey what they have learned from one task to another well. They do not easily master skills that are academic in nature, such as the times tables or spelling rules. Perhaps the most exasperating trait is their inability to have long-term goals. They live in the present, and so have considerable problems with time management perhaps due to a short attention span and poor concentration skills. One thing which we should remember is that, just because a child not doing well in one class does not make that student a slow learner. Also, slow learners vary from reluctant learners. A slow learner to begin with wants to learn, but has a problem with the process. A reluctant or hesitant learner is not motivated and can also be passive aggressive, creating more problems for teachers and parents through non-cooperation.

Reluctant learners seldom have learning disabilities. We experienced a huge setback while teaching final year additional batch students in prosthodontics in 2019. For the first time, after two decades of teaching, we experienced a devastating University examination result in which all the eleven students who appeared for the exams failed. We were in a state of shock and we were not able to comprehend the results. After careful contemplation and deliberation we decided to teach the students with modified education tool, MILA. MILA is educational process which involves multiple method of learning of which can be customized to individual students based on their aptitude and acumen. In this situation, we employed methods like Game based learning, Video tutorial learning, Debate based learning, Peer led team based learning and Process Oriented Guided Inquiry Learning. The students were also involved in Quiz based learning which enabled them to perform much better in the fill in the blanks questions. The training of the students with MILA was very satisfactory to us and the confidence levels of the students improved greatly and their understanding of the subject also immensely improved. Much to our delight all the students who appeared next time for the University examination cleared the exams in flying colors. The external examiners also expressed great happiness and testified the success of the technique of MILA.

CONCLUSION

MILA was easy to be applied in prosthodontic training successfully. Based on the analysis of the student's performance in classroom they seem to enjoy with their peers in the due course of interactive learning. Based on analysis of the student's results there seemed a significant enhancement in final assessments comparative to their baseline assessments. There seems to be an increased desire for learning by applying MILA eliminating monotonous hours of classroom learning. Based on exam performance there has been a considerable difference in the performances of students. We encourage and highly recommend implementation of MILA in teaching prosthodontics in dentistry.

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