

## **MILA in Teaching General Pathology for Dental Students**

Dr. Deepak Nallaswamy Veeraiyan, Director for Academics, SIMATS.

Professor, Department of Prosthodontics, Saveetha Dental College and Hospital, SIMATS.

E-mail: dir.acad.sac@saveetha.com

Dr.M. Subha\*, Associate Professor, Department of Oral Medicine & Radiology, Saveetha Dental College and Hospital, SIMATS. E-mail: doctorsubha@gmail.com

Dr.V.B. Preejitha, Tutor, Department of General Pathology, Saveetha Dental College and Hospitals, SIMATS.

Dr.S. Leslie Rani, Tutor, Department of General Pathology, Saveetha Dental College and Hospitals, SIMATS.

Dr.M.P. Brundha, Associate Professor, Department of Pathology, Saveetha Dental College and Hospitals, SIMATS. E-mail: mpbrundha7@gmail.com

**Abstract---** Multiple Integrated learning algorithm (MILA), is a learning innovation which enables easy learning to the students. General Pathology being a complex subject but requires a lot of understanding to be a greater clinician. This subject needs understanding, memory and application which enables students in diagnosing the diseases and treating them with utmost care. The students get perplexed with the complexity in pathogenesis at cellular level. The understanding of the disease at molecular level is essential for prescribing drugs for the disease. This article focuses on a few chosen topics made easy with MILA. This enhanced the learning by the students.

**Keywords---** MILA, General Pathology, Inflammation, Necrosis, RBC.

### **INTRODUCTION**

Activity based learning is an evolution in the teaching learning process to overcome the limitations from conventional teaching or learning (Patil et al. 2016; "Website" n.d.). Clarity in theoretical concepts is essential for application in reality. However this cannot be achieved by conventional teaching (Rogers 2009) Transformation from conventional teaching to activity based learning has a positive influence on students. (Rogers 2009; Cummings and Sheeran 2019) By reinforcing concepts learned during lecture, visually teaching new concepts and providing an outlet where the students are free to interact more casually with the instructor and their peers enhances their concentration and confidence. (Kanchanamala and Muppidi 2016).

ABL is a reformed approach that enhances students' active learning through various activities to develop cognitive, affective, and psychomotor skills equally. (Chaiyama 2018) Jonassen 2000 stated that learning is a highly complex process. Therefore, an effective learning process cannot be done with a single approach. ABL was developed as a learning approach that encourages and develops students' active participation in learning by hands-on experiences in a multitude of learning environments inside and outside of campus. (Haslam, n.d.).

MILA in teaching is an innovative approach which reduces the lecture time to 20 minutes thereby engaging the students with lecture based activity for remaining 20 minutes. This helps in reducing the boredom lectures. This teaching methodology was highly appreciated by students as it helps to understand the subject easily and provides an easy way to remember the difficult topics. It is also beneficial to the teaching staff as they no need to continuously take lecture classes for 40 minutes.

This article is on how effectively an activity based learning is helpful in learning general pathology among the dental undergraduate students. All three case studies had utilised different types of learning and are discussed based on either the scores or students perception.

### ***MILA in Teaching Concepts of Necrosis***

Pathology is a vast syllabus and has numerous complicated concepts that make the students get confused to click out the important and correct concepts of various disorders. Students have difficulty in understanding the pathological concepts of cell injury and cell death especially 'Necrosis' like etiopathogenesis, morphological features including gross and microscopic features. In the undergraduate curriculum, understanding the morphological features of the lesion is a challenging aspect. In the study done by Kathan R et al mentioned that Morphological knowledge is very important for understanding pathology (Kanthan and Senger 2011). Though morphological features of a lesion need microscopic study, we used 'clay modeling' of the pathological features of necrosis for understanding the morphological features. We in our class used this 'clay modeling' as an activity in between the short session of lecture for 20 minutes. This activity-based learning method called the 'Multiple Interactive Learning Algorithm (MILA)' was introduced in 2014 ("Website" n.d.). In this system of learning, there will be a short lecture for 20 minutes followed by 20 minutes of interactive and non-interactive activities given to the students. In the time of the lecture, the facilitator will describe the concepts of the selected topic of the class schedule. After the lecture, an activity will be given about the concept discussed. In this monograph, we described the methods and results of the MILA system used in the pathology classroom for the second-year undergraduate students regarding 'Necrosis'.

### **METHODOLOGY**

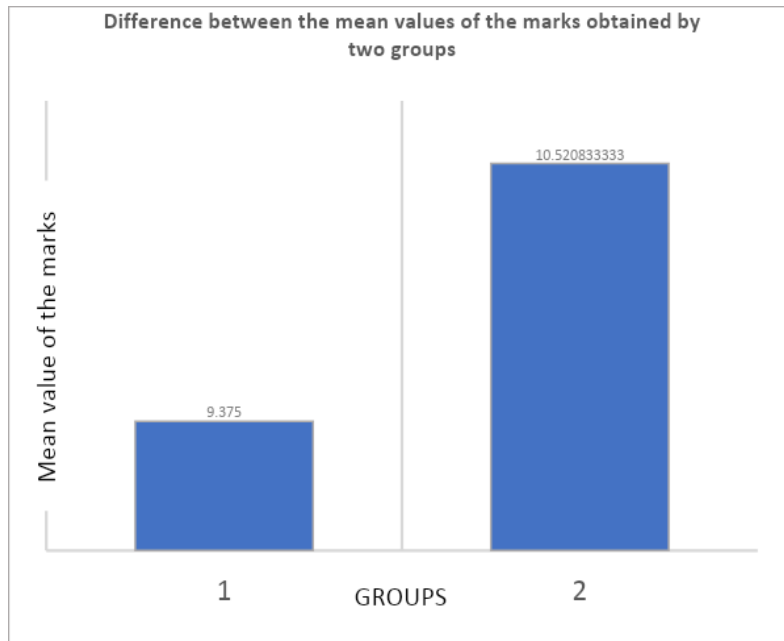
The study was conducted in the Lecture hall, Department of Pathology, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences. In our study, as per the Multiple Interactive Learning Algorithm (MILA), the entire second year dental undergraduate students were divided into small groups of around twenty-five to thirty students in each batch. With the sample population of twenty-five second-year undergraduate students, in MILA we utilized forty minutes out of the one hundred twenty minutes for the topic 'Necrosis'. Out of the forty minutes, the first twenty minutes were given for flipped class sessions and the next twenty minutes were given for the activity 'Clay modeling'. The protocol included in the Flipped class session was 1) Visualisation of a short keynote video for first three minutes, 2) Interactive discussion about the concepts shown in the video, 3) Discussion of the points for further understanding in order and the Clay modeling session, the students were segregated in five groups with three to five students in each group. The students were allowed to make a 2D model on microscopic features of the types of Necrosis for 20 minutes. Each group was given one type of necrosis. After the clay modeling activity, the students were allowed to discuss the salient features of the microscopy of the different types of necrosis. The level of understanding of the correct pathological concepts of the necrosis among the students was analyzed by their performance in the model theory examination which was evaluated by an external examiner in an unbiased manner. This group was considered group 2 and group 1 comprised 25 randomly selected students from the previous year batch of second-year students who were taught in the conventional lecture for forty-five minutes of the large group teaching method.

### **RESULTS**

The results of the student performance and attentiveness were compared among the two groups.

Table 1: Conventional Method of Teaching Versus MILA System of Teaching.

Group	No. of students	Mean	Std dev	p- value	Statistical significance
Conventional method of teaching	25	9.300	2.107	0.028	Significant (<0.05)
MILA system of learning	25	10.500	1.646		



Graph 1: Comparison of the Two Means of the Marks Obtained by Two Groups

As table 1 showed the marks obtained by the students trained by Multiple interactive learning algorithms were at a higher level than the conventional method of the teaching method. The mean values of the two groups were shown in graph 1. The mean value of the marks of the group 1 is 9.3, and the group 2 is 10.5. The student t-test was performed with the results obtained. The p Value is 0.028 which is <0.05 and there is a statistically significant difference between the two groups. The student’s attentiveness and interaction are also increased in the MILA learning method compared to the conventional teaching method. Modelling based activities create the ability of argumentation, visualization, and analogical reasoning among students (Millis and Cottell 1998; Anderson and Yates 1999). Millis et al in their study suggested that faculty should introduce cooperative learning in higher education which includes reciprocal or paired teaching activities, interactive lectures, and problem-based learning methodology to clarify the concepts of pathology among the students (Millis and Cottell 1998). In our study, we focused the same and found that the MILA system of learning pathology is helpful for the students.

**MILA in Teaching RBC Disorders**

MILA in teaching “RBC DISORDERS ” a difficult and confusing topic. Students have a difficulty in correlating the laboratory findings which is quite confusing in case of the RBC DISORDER. We utilised a method of case representation and pictorial representation type of pedagogy.RBC disorders is a vast and huge topic.

Various nutritional anemias, thalassemias, sickle anaemia come under this topic. For better understanding we made the students analyze the anaemias by giving the clinical case representation form. Clinical symptoms and some lab findings were included In the case history and students were asked to identify the type of RBC disorder. The classes were taken and the students were made to understand the concept of the topic and then with case

presentation and pictorial representation the various topics were covered so that they never got confused and had a clear cut idea on the topic.

The microscopic findings and case histories were compiled to make them analysed and recollect and correlate the findings and diagnose what disorder it comes under. The classes were taken as usual. After the classes were taken, they were made to revise and brush the topics once again. Then the activity was given to the students by PowerPoint presentation.

Peer led team based learning was the activity we utilised for this study. They were divided into Group A and Group B. The students were given time to understand the question and the pictures to discuss with their peers and finally answer it.

Therefore this helps the students to apply what they have studied. This method has helped the students to analyse and learn and apply the concepts they have studied rather than blindly reading the topics. When they take care to analyse and apply it, it stays in their memory and helps them to recollect it whenever required. A test conducted in the following showed good results.

There has been a slight increase in understanding the concepts that have been taught. This shows that pictorial method and case history representation method has helped them to understand and grasp the concepts of this particular topic. The lab findings which were quite confusing for the students which later after the case representation and pictorial gaming was made simple for them.

This results in the following test showed that students have fully understood the concept. This type of activity also helps them to correlate the clinical symptoms and diagnose the disease rather than blindly reading the topics. This helps them to improve their analytical knowledge as well. Thus this shows that more than a monologue's class, involving the students and helping them correlate what they have learnt in class by giving activity helps them improve in their studies. Overall, we believe teaching students by this method is effective for teaching RBC disorders.

<p><i>A patient is diagnosed with <b>mild chronic anaemia</b>, spleen palpable, with <b>blood film of mild anisopoikilocytosis, microcytosis, hypochromia</b>. What is your diagnosis? And how will you <b>confirm</b> the diagnosis?</i></p>	
---	--

### ***MILA in Teaching Chemical Mediators of Inflammation***

We followed this MILA (Multiple Interactive Learning Algorithm) technique in General Pathology to teach the "Chemical Mediators of Inflammation". As there are many chemical mediators, it's quite difficult for the students to remember its source of production, its functions, types and examples.

There are various methods used in MILA which includes, PEER LED, POGIL, SCALEUP, CRITICAL THINKING, CLAY MOLDING, CONCEPT MAPPING, etc.

We utilised DIGITAL BASED ACTIVITY- MATCH THE MEMORY as one of the methods of pedagogy in a class between 8:30 am to 9:15 am. The objective of this learning game is to render the learning experience with more fun, to engage learners and to keep them motivated (Khenissi et al. 2014). Recent research on "brain training" renews

promise for improving memory and other cognitive skills (Deveau et al. 2014). Here, we focus on improving the speed of thinking and training the short term memory into long term memory through this digital based activity.

A flipped video was provided to the students, followed by discussion and a brief introduction was given about Digital based activity (Match the Memory). Match the memory is a fun game, where you need to match pairs of tiles. Game is completed once all the tiles are matched. Here, tiles to be paired can be denoted with picture- picture, text-text or picture-text. This helps in recalling and remembering the new terms, its definition, source, types, functions. As pictures are also included in this game it makes students identify the perfect match quickly. The time duration to complete the game and number of flips are considered for the scoring system. Students who take the minimum time and minimum number of flips to complete will top the leader board. A link was created and sent through whatsapp to all students.

Advantage of MATCH THE MEMORY includes improved concentration, train visual memory, increase short term memory, increase attention to detail, improve the ability to find similarities and differences in objects, help to classify objects that are grouped by similar traits, improve vocabulary.

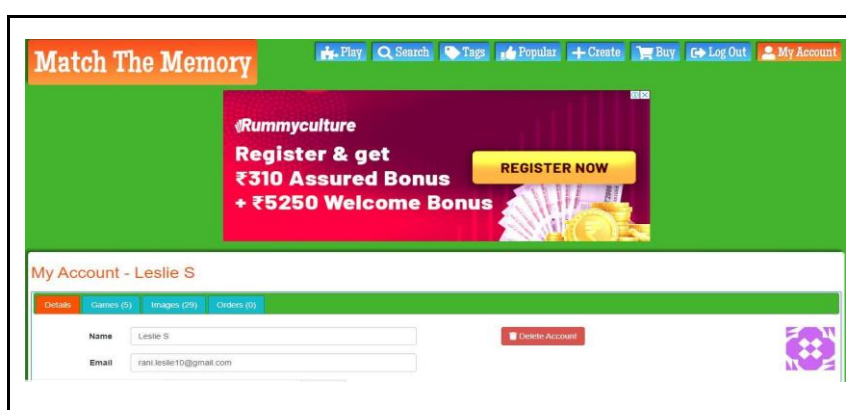
The major advantage of this game is to enhance the speed of thinking. Students can play anywhere and at any time and also many times. Instead of studying the entire text book for revision, students can play this game two or more times. This gives them better recollection of the terms along with pictures.

### ***How was the Game Created?***

There is a website named “matcthememory.com”. Creating a new game step by step is given in figure 1. First, an account must be opened in order to create a new game. Shows the details of the created account. It displays the number of games created and images uploaded. Secondly, create a new game (circled in the figure) by choosing the icon. The title of the new game is given as Chemical Mediators II. The game is made public. Layout of the card can be chosen. To encourage the winner pop up message can be created like Hurray.

The design of the back and front of the card are selected. Even the colour and the font of the text can be of our choice. There are various card types like Pic-Pic, Text-Text, Pic-Text as shown in the below figure. Each card is assigned some specific terms and pictures related to it. How is the game played? Figure 2 gives the order of the game. Pictures to be uploaded have to be dragged in the specified box as shown in the figure Different terms used in each card. In total 9 cards have been created with its corresponding match, it can either be a text or picture format.

Selected cards are shuffled. Link is shared to the students through gmail or whatsapp group. As the student plays the cards get revealed. On completion of the game results get displayed with the time taken and number of flips used to finish the game.



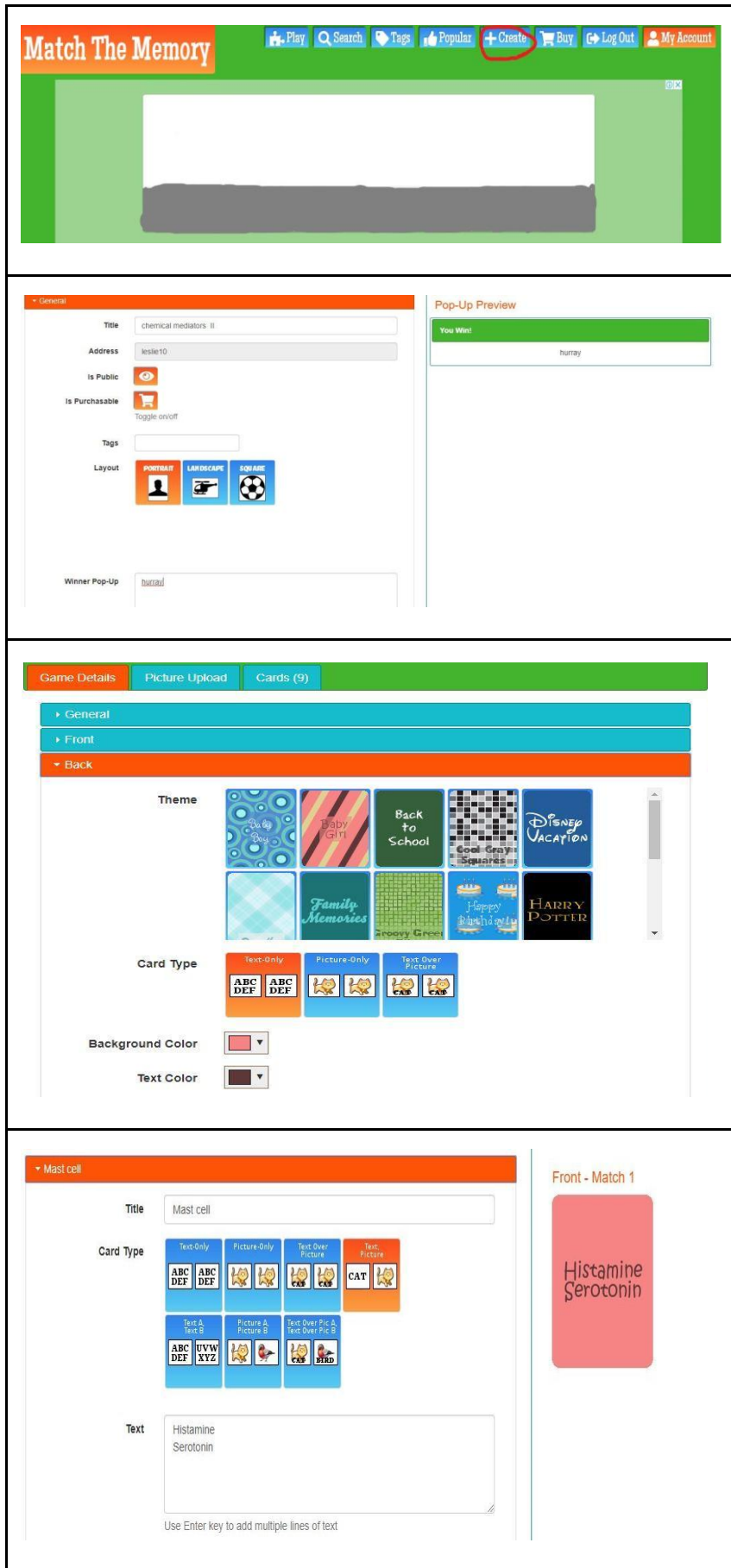


Figure 1: Creating a Game Step by Step

Game Details **Picture Upload** Cards (9)

Drop files here to upload

Arachidonic acid derivative	atrophic tongue	chemotaxis 1	cytokines types	delayed union	Esophageal_web	fat necrosis	Fever	fibrous union
-----------------------------	-----------------	--------------	-----------------	---------------	----------------	--------------	-------	---------------

Game Details **Picture Upload** Cards (9)

Mast cell

Arachidonic acid derivative	atrophic tongue	chemotaxis 1	cytokines types	delayed union	Esophageal_web	fat necrosis	Fever	fibrous union
hairy tongue	hyperostotic scall	isobrychia	islaffective necrosis	Mast cell	nontun	Pain	Pencil cells	Pencil cells

Game Details **Picture Upload** Cards (9)

Mast cell	Eicosanoid	cytokines ty...	Histamine
-----------	------------	-----------------	-----------

Edit Game - chemical mediators II

Game Details **Picture Upload** Cards (9)

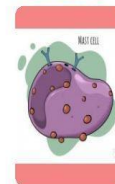
- Mast cell
- cytokines types
- Arachidonic acid derivatives
- Fever
- Vasodilation
- Plasma derived mediators
- Pain
- chemotaxis 1
- kinins

Card Preview

Front - Match 1



Front - Match 2



chemical mediators II

Number of Cards: 18

Cards Flipped: 0 Time: 00:09

chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II
chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II	chemical mediators II





Figure 2: Playing the Game



Demonstration was given to the students on how to play the game. The link was sent to 13 current second year students and was asked to play. When compared to the last year passed out students, the current second year students were able to recall the different types of chemical mediators and its role in inflammation. It is also noticed that there has been a dramatic increase in the speed of thinking.

## CONCLUSION

The MILA learning method is found to be having a dramatic increase in the performance of the students and understanding of the pathological concepts of the Necrosis. Overall, we believe that teaching students by this method is very effective for understanding and learning pathology concepts. We believe teaching students by this method is effective and improves the concentration level. Such dry topics can be memorised easily through these kinds of activities. Students were able to answer whenever the chemical mediators topic came for discussion.

## BIBLIOGRAPHY

- [1] Anderson, Angela, and Gregory C. R. Yates. 1999. "Clay Modelling and Social Modelling: Effects of Interactive Teaching on Young Children's Creative Artmaking." *Educational Psychology*. <https://doi.org/10.1080/0144341990190406>.
- [2] Chaiyama, Nuanphan. 2018. "The Instructional Design Blended Learning Model by Using Active Learning Activities to Develop Learning Skills in 21st Century for Higher Students." *Proceedings of the 2nd International Conference on E-Society, E-Education and E-Technology - ICSET 2018*. <https://doi.org/10.1145/3268808.3268816>.
- [3] Cummings, Daniel J., and Nicola Sheeran. 2019. "Do Academic Motivation and Personality Influence Which Students Benefit the Most from Peer-Assisted Study Sessions?" *Psychology Learning & Teaching*. <https://doi.org/10.1177/1475725719840502>.
- [4] Deveau, Jenni, Susanne M. Jaeggi, Victor Zordan, Calvin Phung, and Aaron R. Seitz. 2014. "How to Build Better Memory Training Games." *Frontiers in Systems Neuroscience* 8: 243.
- [5] Haslam, E. L. n.d. "A Learning Model That Develops Students' Active Learning and Reflective Practices." *Proceedings Frontiers in Education 1997 27th Annual Conference. Teaching and Learning in an Era of Change*. <https://doi.org/10.1109/fie.1997.644822>.
- [6] Kanchanamala, P., and Satish Muppidi. 2016. "SIPAI: An Integrated Learning Model of Self Learning, Inquiry Based, Problem Solving, Activity Based, and Instructional Learning for Engineering Education." 2016 IEEE 6th International Conference on Advanced Computing (IACC). <https://doi.org/10.1109/iacc.2016.156>.
- [7] Kanthan, Rani, and Jenna-Lynn Senger. 2011. "The Impact of Specially Designed Digital Games-Based Learning in Undergraduate Pathology and Medical Education." *Archives of Pathology & Laboratory Medicine* 135 (1): 135-42.
- [8] Khenissi, Mohamed Ali, Fathi Essalmi, Mohamed Jemni, and Kinshuk. 2014. "A Learning Version of Memory Match Game." 2014 IEEE 14th International Conference on Advanced Learning Technologies. <https://doi.org/10.1109/icalt.2014.67>.
- [9] Millis, Barbara J., and Philip G. Cottell. 1998. *Cooperative Learning for Higher Education Faculty*. Greenwood.
- [10] Patil, Ujwala, Suneeta V. Budihal, Saroja V. Siddamal, and Uma K. Mudenagudi. 2016. "Activity Based Teaching Learning: An Experience." *Journal of Engineering Education Transformations*.

<https://doi.org/10.16920/jeet/2016/v0i0/85433>.

- [11] Rogers, Daniel T. 2009. "The Working Alliance in Teaching and Learning: Theoretical Clarity and Research Implications." *International Journal for the Scholarship of Teaching and Learning*. <https://doi.org/10.20429/ijstl.2009.030228>.
- [12] "Website." n.d. Accessed August 14, 2020a. Patil, Ujwala, Suneeta V. Budihal, Saroja V. Siddamal, and Uma K. Mudenagudi. 2016. "Activity Based Teaching Learning: An Experience." *Journal of Engineering Education Transformations*. <https://doi.org/10.16920/jeet/2016/v0i0/85433>.
- [13] Deepak.N "MILA: A New Education System", <http://eventssaveetha.blogspot.com/2015/05/mila-new-education-system-by-dr-deepak.html>. Lastly accessed date 27/1/2020.