MILA in Teaching Human Anatomy 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@saveetha.com

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

K. Yuvaraj Babu, Assistant Professor, Department of Anatomy, Saveetha Dental College and Hospital, SIMATS. E-mail: yuvarajbabu@saveetha.com

Karthik Ganesh Mohanraj, Assistant Professor, Department of Anatomy, Saveetha Dental College and Hospital, SIMATS. E-mail: karthikm.sdc@saveetha.com

Dr. Lavanya Prathap, Assistant Professor, Department of Anatomy, Saveetha Dental College and Hospital, SIMATS. E-mail: lavanyap.sdc@saveetha.com

Ganesh Lakshmanan, Senior Lecturer, Department of Anatomy, Saveetha Dental College and Hospital, SIMATS. E-mail: ganeshl.sdc@saveetha.com

Dr. Dinesh Premavathy, Senior Lecturer, Department of Anatomy, Saveetha Dental College and Hospital, SIMATS. E-mail: dinesh801anatomy@gmail.com

S. Sangeetha, Lecturer, Department of Anatomy, Saveetha Dental College and Hospital, SIMATS.
E-mail: sangeethas.sdc@saveetha.com

Abstract--- MILA, Multiple interactive learning algorithms are an innovation in teaching and learning. Since conventional teaching methodology involves one way communication it prevents students from active participation. MILA is a methodology which involves active participation by the students in the form of activity and discussions. Activity based learning is an evolution in the teaching learning process to overcome the limitations from conventional teaching or learning [1]. Clarity in theoretical concepts is essential for application in reality. However this cannot be achieved by conventional teaching [2]. Transformation from conventional teaching to activity based learning has a positive influence on students [2,3]. 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 [4]. Activity-based learning prescribes an array of methods of pedagogical approaches to teaching. Its core practice lies on hands-on experiments and activities [5]. In our study we have tried numerous activities in teaching head and neck anatomy to dental undergraduate students. We have tried numerous individual and team activities in teaching anatomy. The activities include concept mapping, model making using chart, clay modelling, sketching, etc. A short flipped video followed by interaction with the facilitator and activity which enables students to have an active learning session. We found it to be a very effective learning methodology based on the students' performance and the feedback we received from the students.

Keywords--- Flipped Class, Teaching, Learning, Clay Modelling, Activity based Learning.

INTRODUCTION

Lecture sessions have been established to be one of the most inefficient methods of knowledge sharing for many decades [6]. The average student remembers less than 10% of what is taught in class and the overall standard of education is compromised by the use of large classrooms with impersonalised speeches [7]. Lecture sessions are also reported to be boring and inconsistent when similar topics are repeated between classes. Although adjuvants like presentations and slides promised to make lectures more effective, In reality they only led to increased boredom of faculty merely reading everlasting scripts with little to no passion [8]. By the early 2000's SMART classrooms were considered the holy grail of education [9]. The initial wave of positive review and the aura of technology propelled thousands of institutions across the globe to purchase high end smart board equipment. But over time they have also proved to be in-vain.

Over the past decade, other platforms tried to replace the smart board as the next big thing [9]. One major contender with tremendous promise was the iPad®/Tablet system coupled with polished software that promised to make course work and learning easier [7]. To an extent, these systems have shown some successful integration. The use of vital books and tablets notes have become common practice in most institutions and however the impact of this on the student learning and long term retention are questionable [10]. Tablets do provide easy access to a wide variety of sources and videos. Video based tutorials in youtube and in classrooms have become very popular and seem to impact the understanding of the learning of the individuals [11]. Nevertheless, the quality of content creation and lack of curation / reviews have made it very difficult to search for the right content. Many students have reported difficulty in effectively utilizing these resources with ease.

Learning management systems such as Blackboard®, Canvas® have been used extensively for content delivery, eventually they have become replaced by efficient services like Google Classroom®, Moodle® etc [12]. Classrooms have even gone virtual with Zoom®, Google Meet®, Cisco WebX® etc [13]. These methods have opened new paradigms for teachers to connect with students across long distances. It's evident from above mentioned facts that the majority of the focus in education primarily aimed to make teaching fancy, more technologically savvy etc. Unfortunately the focus on technology has not improved the spirit of education. Very little has been done to improve the quality of the teaching learning process with the available simple cognitive tools [14].

In this article, we have tried MILA, Multiple Interactive Learning Algorithm in teaching Head and Neck Anatomy for Undergraduate dental students. Seven difficult topics were chosen, handled by different faculty and reported as a case series. Each faculty had tried innovative ideas in making learning easier. The sessions were of 2 hours time which includes a flipped video session, interactive session, activity session and feedback or assessment session in any order of convenience.

MILA in Teaching Facial Nerve

Anatomy of the facial nerve is an important topic which has a significant role in day to day clinical practice. The facial nerve has a complex anatomical course and so, a thorough understanding of the course of the facial nerve is essential to localize the sites of its pathology with varying effects [1] [2] [3].

The facial nerve is the seventh cranial nerve (CN VII). It arises from the brain stem and extends posteriorly to the abducens nerve and anteriorly to the vestibulocochlear nerve. It courses through the facial canal in the temporal bone and exits through the stylomastoid foramen after which it divides into five terminal branches at the posterior edge of the parotid gland. The facial nerve provides motor innervation of facial muscles that are responsible for facial

expression, parasympathetic innervation of the glands of the oral cavity and the lacrimal gland, and sensory innervation of the anterior two-thirds of the tongue.

The facial nerve carries both motor and sensory fibers. Motor axons innervate the muscles of facial expression and the stapedius muscle. Parasympathetic fibers go to the ganglia that supply glands in the oral cavity and the lacrimal gland. The sensory component provides innervation to the external auditory meatus, the tympanic membrane, and the pinna of the ear. The facial nerve also carries a taste sensation from the anterior two-thirds of the tongue.

The difficulty to understand this topic for a first year dental student is many folds. The different nuclei of facial nerve present in the brain stem with different functional components initiates the complexity of the topic. To further compound the difficulty in understanding the anatomy lies the facial nerve's intratemporal course. The applied anatomy of the nerve involving the upper motor neuron lesion and lower motor neuron lesion and the differing clinical presentation based on strong anatomical correlation adds even more complexity and versatility for the topic.

To understand all the above mentioned concepts involved, students need more than just PowerPoint presentations or black board chalk and talk teaching methods as tools. We used Multiple Integrative Learning Algorithms to meet this daunting task. We approached this topic with concept mapping pedagogy and wire modelling of the nerve based on the concept mapping to make the topic familiarise and grasp the ideas and concepts behind the anatomy of the facial nerve. Following the flipped class on facial nerve anatomy involving video lecture and explaining the same to the small group learning students, using the Ipad, the students were asked to draw a concept map of the facial nerve (Figure 1). The students started to make concept maps from the nuclear levels and a flow chart of different components of facial nerve was drawn. Using the concept mapping, the students were then asked to do a colour wiring flow chart of anatomy of facial nerve using electronic circuit core wires which are very malleable and come in multi colours(Figure 2).

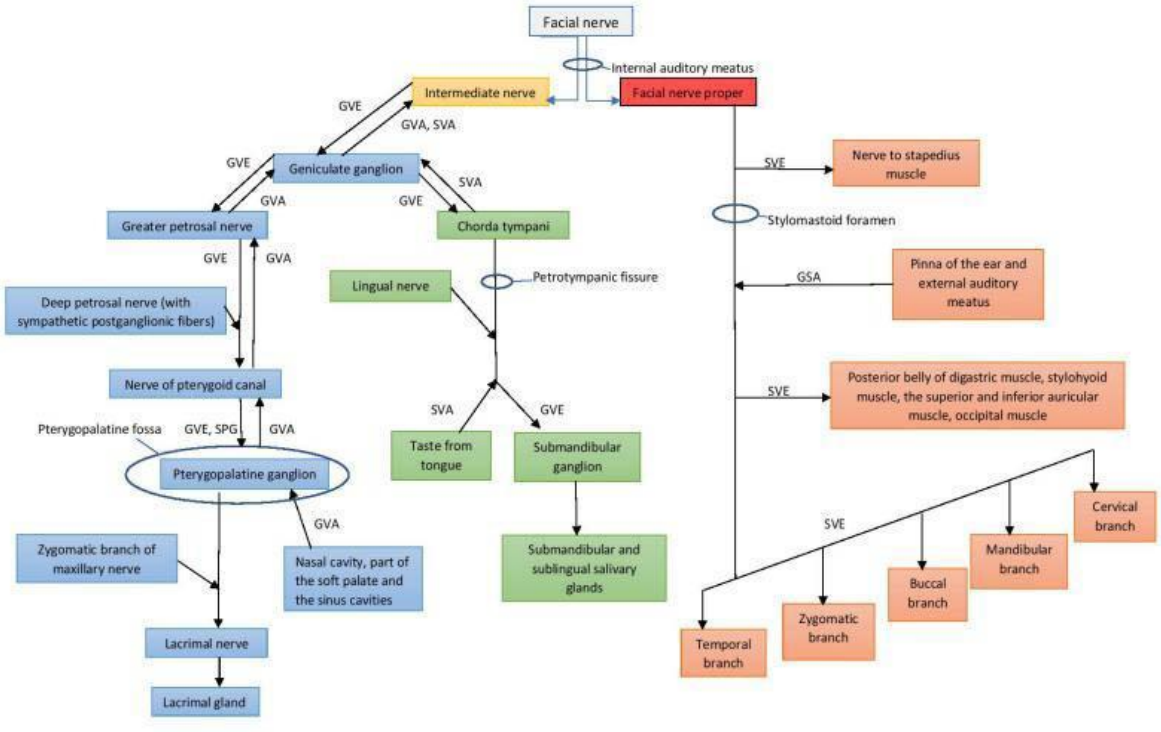

Figure 1: Concept Mapping of Facial Nerve

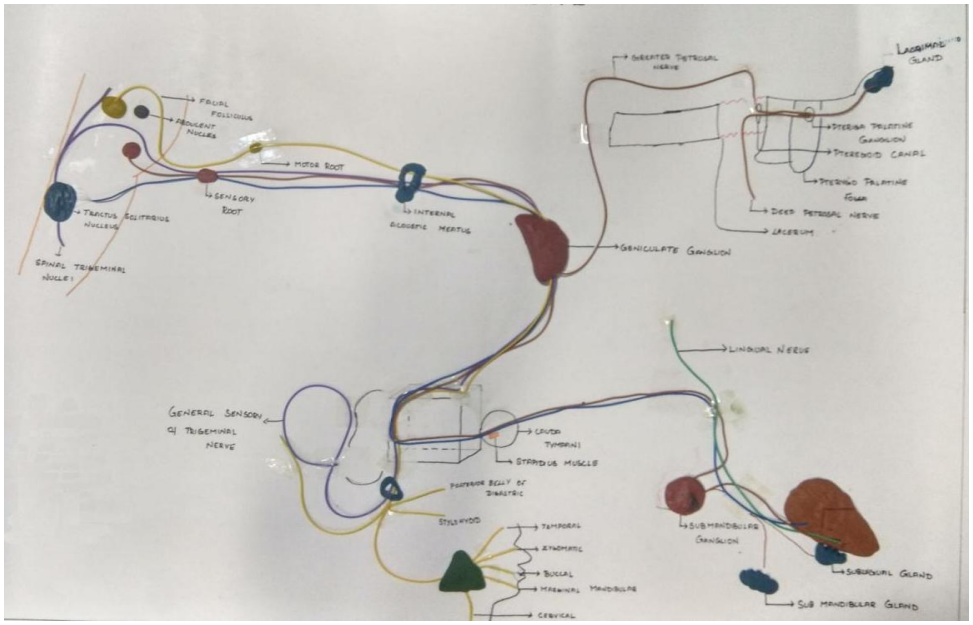

Figure 2: Coloured wire Chart of Facial Nerve

This activity greatly enhanced the core concept grasping involved in anatomy. Doing this as a play way method, the logics involved become different and intriguing for the students. Students reviewed that this activity greatly enhanced their understanding of anatomy of the facial nerve.

MILA in Teaching "Cavernous Sinus"

MILA in teaching "Cavernous Sinus" is a challenge. Students have difficulty in understanding its relations, tributaries and drainage channels /communications. This has been widely reported in various publications. Cavernous sinus is a large dural venous space situated in the middle cranial fossa on each side of the body of the sphenoid bone between the outer endosteal (internal periosteum) layer and inner meningeal layer of the dura mater of the brain. The relations and various aspects of cavernous sinus anatomy is difficult to understand [15]. Also, the understanding of the borders and walls that contain the cavernous sinus is extremely important in applied anatomical aspects, as this gives a proper orientation of various tumours in relation to the surrounding neurovascular structures [16]. The various channels in the cavernous sinus have numerous complex incoming and draining venous connections with the adjacent structures [17]. Thus this kind of complex anatomy of cavernous sinus is a topic to be studied and understood meticulously and also to be taught to students in a simple and easy way for better understanding.

We utilised the "Clay Modelling" method of pedagogy. Flipped Class in MILA is a learner-centered model. In the flipped classroom the lecture content of a topic is explained in the form of 8-10 minutes video followed by an active teaching which extends for about 20 minutes followed by the activity session commences.

The protocol for the clay modelling activity consists of dividing the students into several small groups containing maximum 4 or 5 students in each group. Each group was provided with a coloured chart and 1 box of clay containing various colours. With the help of the video and the explanation given the students first drew the outline of the Cavernous sinus, its relations on both the lateral walls, tributaries, and the draining channels. They used the clay and created a cavernous sinus3D form model over the picture drawn in the chart. Each structure was depicted in different colours. The tributaries and the communications were represented with coloured thin wires. The colour coding helps them differentiate each structure clearly. Interestingly, they used different strategies and innovative ideas to represent the caverns in the cavernous sinus. This clay art modelling is a fun filled activity which improves hand-eye

coordination skills, develops fine motor skills, improves creativity and above all encourages activity based learning among students. This type of activity makes all the members in a group get involved and engaged in this process. Once there is coordination between the hands and eye by brain, it intentionally makes even the slow learner of the group to get actively involved in sculpting the clay model of any complex topic. The final architecture image gets portrayed deeper in their mind and the incoming channels of the cavernous sinus follows a pattern of referenced memory with clues (colour, image shape, friend's name, etc.) to represent the tributaries.

There has been a dramatic increase in understanding the concepts like its relations, tributaries and communications upon preparing a clay model of cavernous sinus. The salient features in remembering these concepts are the various colour clues used in the model. This gives a reference oriented memory in acquiring the names of the structures. All these cues prepare the student efficiently to analyse, understand and retain the concept thoroughly. Also this topic is of utmost clinical importance as many cranial nerves and internal carotid arteries pass through this valve-less dural venous sinuses.

Overall, we believe teaching students by this method is effective for teaching "Cavernous Sinus". The graphical representation of student's perception on activity based learning in MILA is shown in the figure below (Figure 3). The images show the various clay models prepared by I. BDS students in their Anatomy class (Figure 4).

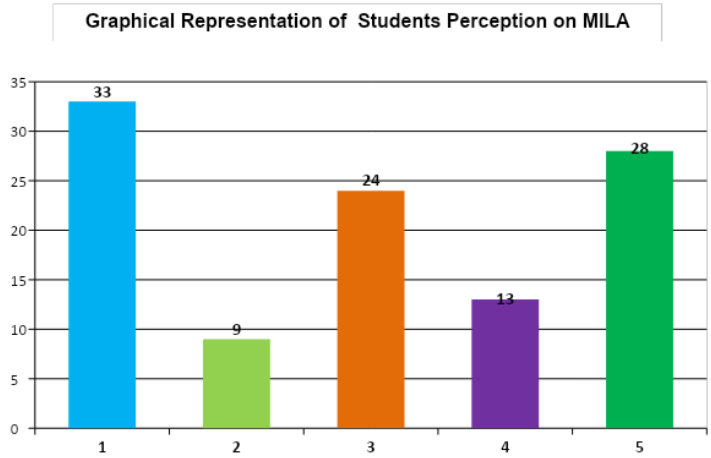

Figure 3: Bar Chart Showing Student's Perception on MILA (%)

Figure 4: Coloured Clay Modeling of Cavernous Sinus by 5 Groups of Students

MILA in Teaching Middle Ear

Middle ear is a very complicated concept. Students have difficulty in understanding the concepts of boundaries, its features and their communications. This has been widely reported in various publications [18] [19] [20].

We utilised small group learning with video presentation, group discussion and problem solving quiz method of pedagogy (Figure 5 and Figure 6).

The protocol included as follows orientation and video presentation for 20 minutes, learner facilitator clarification for 20 minutes. Group Activity for40minutes Individual and within group would work for 20 minutes and between groups for 20 minutes and each group will present for 10minutes.

Pre-learning of the given concepts using learning resources is encouraged before they appear for in-class interactive sessions. The learning materials like preloaded videos, I books, reference text books are provided to them. The topic of discussion is uploaded on the schoology platform well before the active session with the activity sheets for better preparation and time management.

There has been a dramatic increase in student's perception and understanding of the difficult concepts of the middle ear. The Multiple interacting learning algorithm allows the learner to engage actively throughout the session. As the learning system is interspersed every 20 minutes, the monotony in the learning process is cracked. The learners and the facilitators have an equal enthusiastic participation during the session. As we encourage group activities, in addition to learning the key concepts of the ear, they develop healthy interpersonal relationships and leadership qualities. In group presentations all the students are given equal opportunities to express themselves. It allows them to build self-confidence. The activities allow the learners to critically think and analyse the concepts to come out with answers. It helps to provoke their thinking, creative and application skills (Figure 7).

Overall, we believe teaching students by this method is effective for teaching anatomy of the middle ear cavity.

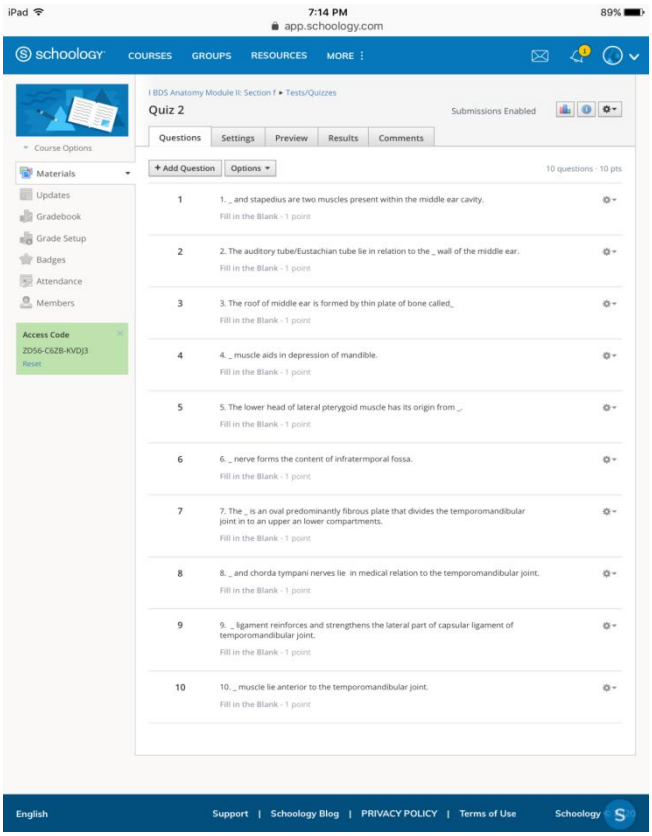

Figure 5: Take Home Quiz

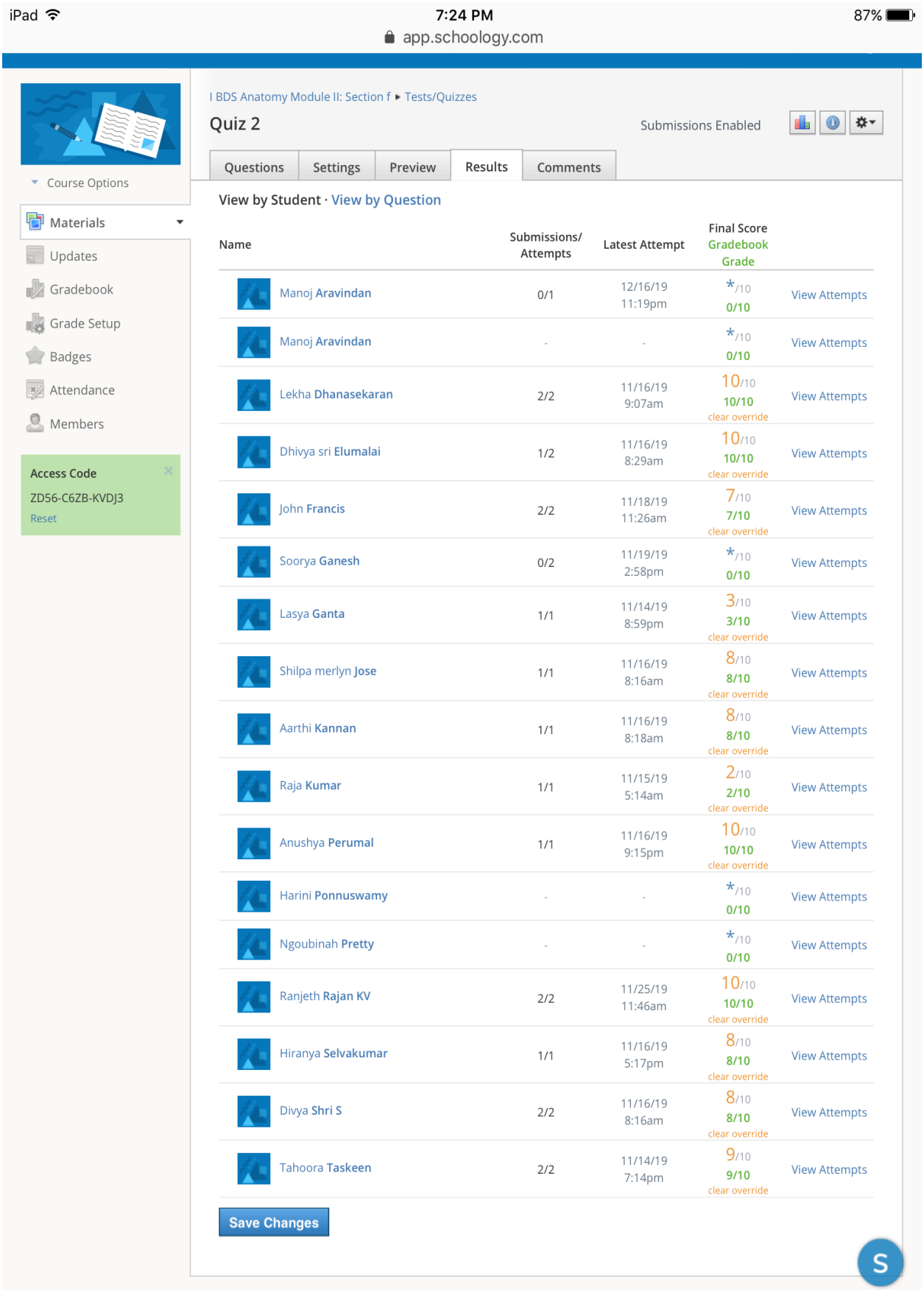

Figure 6: Result of Take Home Quiz

Feedback Form Report MILA teaching method: Topic- Middle ear for class held on 14/11/19

Questions	Strongly Agree %	Agree %	Not sure %	Disagree %	Strongly disagree %
Prior to session the topic was challenging to understand	44	31	25	-	-
Orientation/ Discussion was helpful	56	31	06	-	-
Video presentation stimulated fresh insight	25	56	19	-	-
Problem solving quiz enabled critical thinking	50	50	-	-	-
Group learning fostered exchange of knowledge and information	44	56	-	-	-
Received useful helpful feedback via quiz in schoology platform	56	44	-	-	-
Teaching methodology enabled relaxed learning environment	44	38	19	-	-
Gave me greater responsibility for myself and group	38	56	06	-	-
Post session knowledge about concept was clear and improved my performance	50	44	06	-	-
This method of learning should be encouraged/ continued	44	50	06	-	-

Figure 7: Student Feedback Report

MILA in Teaching Anatomy of Orbit

The anatomy of the orbit and the function of the six extraocular muscles of the eye is a challenging and frequently misunderstood concept amongst students [21]. The insertion and action of extra ocular muscle is a very complicated concept [22]. The actions of the individual extraocular muscles are usually explained to students in a lecture format by showing the relationship of each muscle to the axes of the eyeball and the walls of the bony orbit. The lateral and medial rectus muscles cross only the vertical axis, and consequently, cause only abduction and adduction, respectively. In contrast, the superior and inferior oblique and rectus muscles cross all three axes (vertical, horizontal, and anteroposterior) of the globe. Therefore, concentric contraction of each of these muscles results in three movements; abduction or adduction, elevation or depression, and intorsion or extortion. Hence it is a challenge to find more feasible ways of teaching extraocular muscle movements to ensure that students can efficiently comprehend the actions of extraocular muscles. This has been widely reported in various publications [1] [2] [3].

We utilised the model making method of MILA. The protocol included after the regular lecture followed by a video on action of extraocular muscle, the students are divided into small groups having 3 to 4 students. Each group was given a small ball to be used as an eyeball, a marker pen to draw the cornea, a few strips of chart paper to be used as the muscles and tape to attach the strips to the ball as muscle insertions.

The four recti muscles are first attached to the eyeball from standard distances of corneoscleral junction. Then the oblique muscles are attached behind the equator of the eyeball passing below or above the recti muscle. The inferior oblique is inserted close to the superior oblique a little below and posterior to it. This ensures the students understanding of the fibre direction and insertion of the extraocular muscles. The students then learn about the action of each muscle by pulling each strip and understanding how the various muscles on contracting exerts a pull on the eyeball producing the movements in various axes.

A thorough understanding of the action of each muscle is essential to clinically test the integrity of cranial nerves III, IV & VI (oculomotor, trochlear and abducens nerve) supplying these muscles. The knowledge and understanding

of the attachment and actions of these extra-ocular muscles is also useful when learning about conjugate movement of eyeballs and the clinical conditions like squint, diplopia and nystagmus related to paralysis of these muscles.

There has been a dramatic increase in understanding of the concept of how the fibres of the extraocular muscles pass in relation to each other and the orbital wall and gets inserted to the sclera of the eyeball. This knowledge was essential to learn about the actions produced by these muscles in different axes of eyeball (Figure 8). This model allows students to visualize the movements of the extraocular muscles by pulling the "muscles", this activity ultimately helps students to understand the mechanisms of muscle movements with regard to innervation and the rationale for cranial nerve tests. The other advantages of this eye model are that it is low cost and easy to construct.

Overall, we believe teaching students by this method is effective for teaching the action of extraocular muscles and its action.

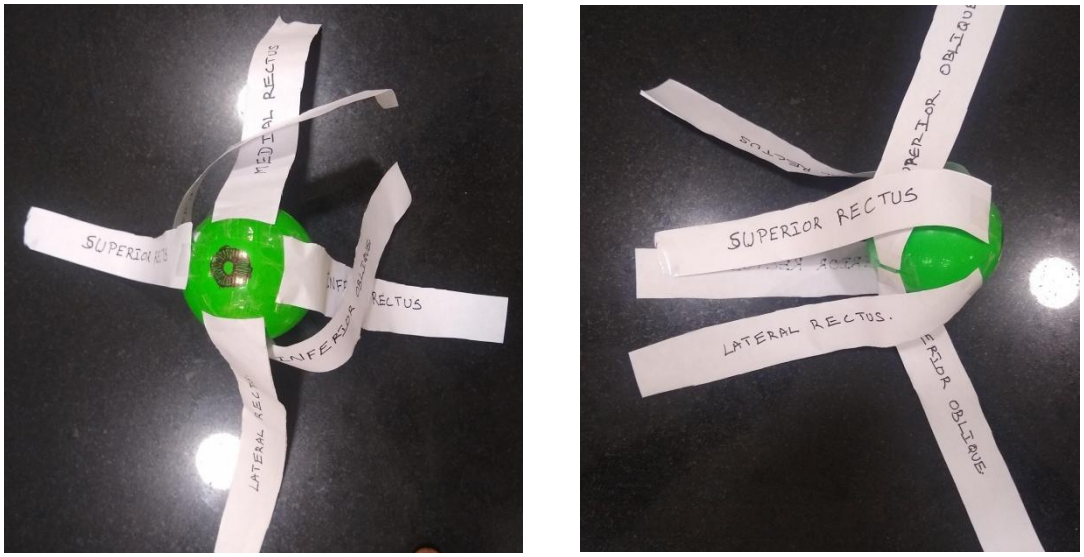

Figure 8: Eyeball Model Developed by Students

MILA in Teaching Muscles of Mastication

Muscles of mastication are the group of muscles that help in movement of the mandible as during chewing and speech. It's a complicated concept to study as these muscles control the opening and closing of the mouth and their equilibrium created within the mouth and it is also related with the movements of the mandible and Temporomandibular joint [23]. The students find it difficult to understand the role of masticatory muscles in relation to temporo mandibular joint dysfunction, inferior alveolar nerve block, and lower denture fitting, orthodontic treatment and in surgical approach of zygomatic complex fractures [24]. This has been widely reported in various publications [1] [2] [3].

We utilised a small group learning method of pedagogy in a class. The protocol included a flip video followed by activities which helps in using the lecture time in an effective and interesting way to the students. The two hours of long boring lecture time is divided into four effective sessions. The first session includes a flip video class about the topic with appropriate diagrams and proper explanation. The video was about 5-6 minutes with all anatomical details and coloured pictures. After the video there was open discussion about the topic which made the students interactive. Each student had their own perception about the topic and shared the views during interaction. Further clarifications and explanations were given to the students. This was followed by session two with a group activity about the topic.

Activity 1. The students were divided into small groups of about 5-6 students. The students were given colour clay dough and asked to fix the clay over the mandible to show the attachments. This method helped them to remember the subject in a better way.

Activity 2. A paper model of each muscle was made and represented over the skull and mandible to show the direction of fibers and exact location with origin and insertion. This helped to know the relations in the skull.

Activity 3. Students were asked to palpate the masticatory muscles of the fellow students. They were asked to do the movements of the mandible. Demonstration was given to position the mandible for TMJ Dislocations. A practical palpation and demonstration helped the students to understand the landmarks and made them confident. This was followed by a cadaver demonstration of masticatory muscles in a dissected specimen. It helped them to feel the texture of the muscle, bone and nerve. The immediate visual perception helped the students to recollect during the exam. The students were asked to take a photograph of the specimen in their ipad and asked to mark the anatomical landmarks and to identify the structures which they saw. This helps them to recollect during practical exams without any confusion.

There has been a dramatic change in the observing skills of the students. The students were more active and interested in the class. There has been a gradual increase in the understanding of the subject, correlating with diagrams and cadaver specimens. The practical palpation made them more confident about the landmarks and moulds them to handle the patients. There has been an increase in the marks of the students (Figure 9). The discussion session helped them to come out of their shell and shyness. It made me interact with all students and helped to understand everyone's point of view (Figure 10).

Overall, we believe teaching students by this method is effective, creative and fun based for teaching the Muscles of mastication along with clinical correlations. This method makes the student confident.

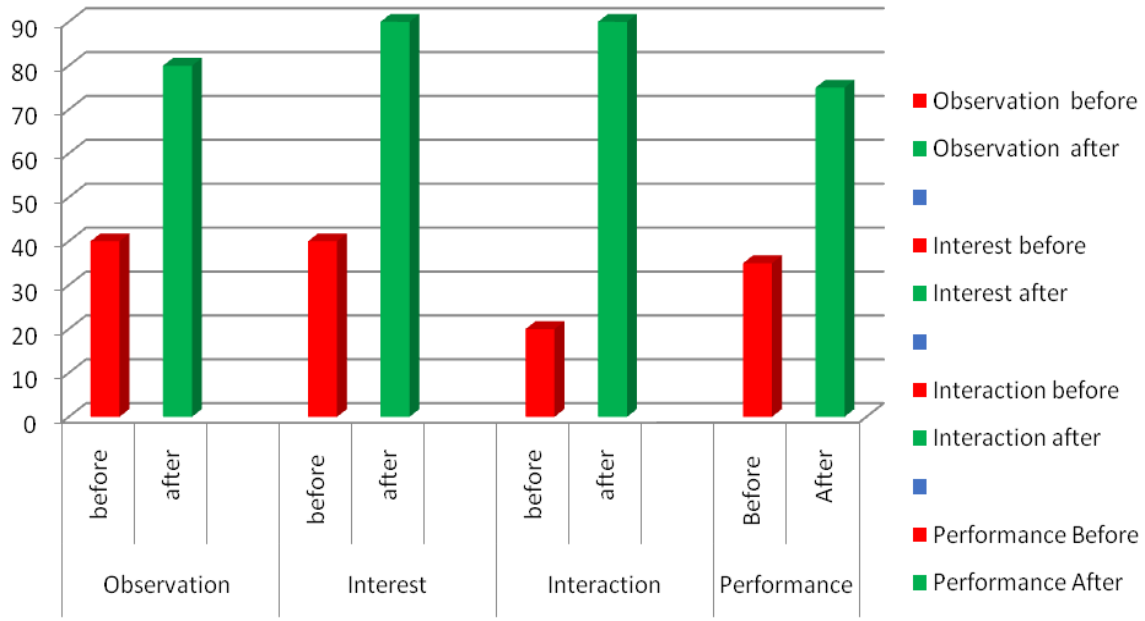

Figure 9: Student Performance before and after MILA

Figure 10: Clay Modelling Done by Students

MILA in Learning Lateral Wall of Nasal Cavity and Opening of Paranasal Air Sinus

The nose followed by nasal cavity is a midline structure that acts as a passage for air to enter and exit during respiration and is also involved in olfaction by containing olfactory receptors. It is partitioned into right and left halves by nasal septum, which is formed by cartilages and bones. It communicates with the external environment through external nostrils and posteriorly with nasopharynx through posterior nasal aperture. It contains a roof, floor, septum and lateral wall. The above mentioned boundaries are formed by bony and cartilaginous structures and lined by mucous membrane.

The bones related to the nasal cavity contain air spaces that help to lighten the weight of the skull, voice resonance, regulate the temperature of air when entered during respiration, etc. The air sinuses are frontal, maxillary, sphenoidal and ethmoidal are situated around the nasal cavity, hence it is called as paranasal air sinuses, the bones containing it are called as pneumatic bones. The nasal cavity is the place where the paranasal air sinus opened i.e. at the lateral wall of the nasal cavity.

The lateral wall of the nasal cavity is a complicated structure that contains various bones with opening of air sinus. It is made up of bones and cartilages such as nasal, maxilla, lacrimal and ethmoid, inferior nasal concha, perpendicular plate of palatine, medial pterygoid plate of sphenoid and alar cartilages [13]. The notable feature of it is the presence of bony shelves such as superior middle and inferior conchae lined by mucous membrane. Between the bony shelves, it contains spaces called meatus, thus the lateral wall contains superior, middle, inferior meatus and also the sphenoethmoidal recess, where paranasal air sinuses opens. Cappello et al., 2018 have reported that the arrangement of sinonasal structures in the head is intricate [15].

Clinically, sinusitis is a more familiar term that the involvement of paranasal air sinuses because they are more often infected. The unintentional damage of air sinuses during surgical approach may cause spread of infection to above mentioned cavities. For example, the approach of ethmoidal air sinus is highly complicated due to its close relation with cranial cavity. The reason for damage may be anatomical variation of air sinuses [14].

It is definitely a challenging topic for me to ease the sinonasal anatomical structures (lateral wall of nasal cavity and paranasal air sinus) for the students. The class of lateral wall of nasal cavity and paranasal air sinus was started by explaining general ideas about the topic like its location, arrangements and its clinical significance. Followed by the lecture class we played the video of the topic. But they felt it was very difficult to understand the skeletal framework of the lateral wall and its feature; opening of air sinuses at various locations of meatuses; blood supply and nerve supply. In case of blood and nerve supply; venous and lymphatic drainage the lateral wall is divided into various quadrants and segments. This is the main reason why students felt difficult to understand.

At the model making session, we planned to make a suitable model to make them understand easily. So we prepared a small booklet in the shape of a lateral wall of the nasal cavity which is there in the skull. Then we drew an arrangement of bones and cartilages in one chart piece followed by opening of the paranasal air sinuses, arterial and nerve supply, venous and lymphatic drainage and finally we made it into a small booklet. By placing that small booklet on the lateral wall in the skull they could easily oriented the bony and cartilaginous arrangements, areas of blood and nerve supply and lymphatic drainage (Figure 11).

At the end of the class, the response of students was good and they asked us to continue the same for all topics. The main advantage of this model is less expenses, easy making and quick recollection of the particular topics. This may be a good tool and easy way to understand the complex or complicated concepts in anatomy.

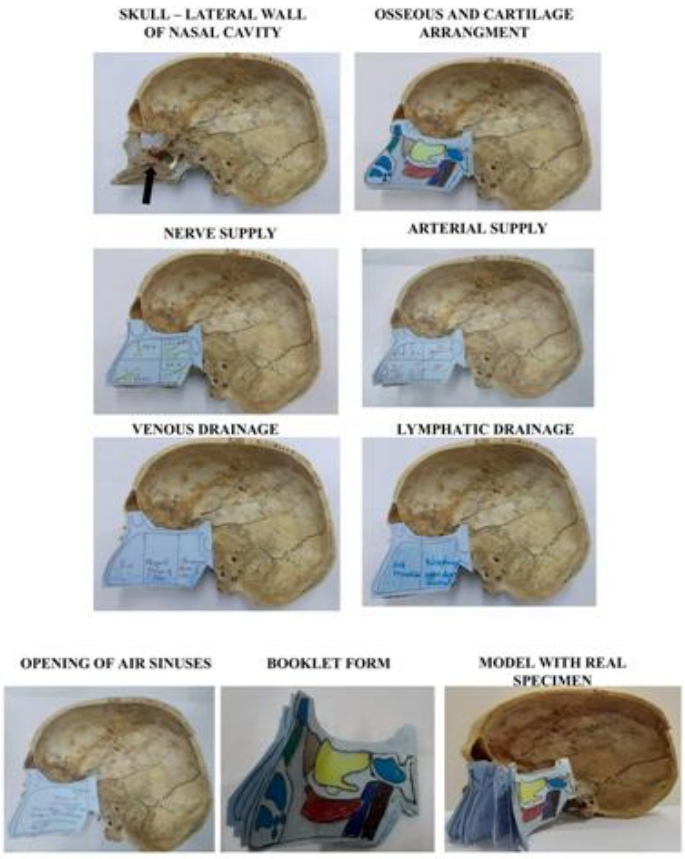

Figure 11: Booklets Placed on the Skull

MILA in Teaching Anatomy of Larynx

Larynx is the organ for the production of voice or phonation and it is also an air passage. It is made up of paired and unpaired cartilages connected by joints, ligaments and muscles. The unpaired cartilages are thyroid, cricoid and epiglottis. The paired cartilages are arytenoid, cuneiform and corniculate.

There are various intrinsic and extrinsic muscles which produce different movements of Larynx. They are cricothyroid, posterior cricoarytenoid, lateral cricoarytenoid, transverse arytenoid, oblique arytenoid, thyroarytenoid and vocalis. The movements are elevation and depression of the larynx, opening and closing of the inlet of the larynx. There are also muscles which act on vocal cord producing adduction and abduction, tension and relaxation.

The muscles and mucous membrane are supplied by internal, external and recurrent laryngeal nerves. All these are branches from the vagus nerve. The blood vessels are superior and inferior laryngeal arteries and veins. The cavity of the larynx is divided into vestibule, ventricle and infraglottic. It extends from the inlet of the larynx to the lower border of cricoid cartilage.

The anatomy of the larynx has been a very complicated concept. The students used to find it very difficult to have a clear image of it and this has been widely reported in various publications [16] [17].

To make it easier we used small group learning with the MILA application. In this video presentation, group discussion and an activity were given.

The two hours class was divided into four small sessions; Orientation and video demonstration for 20 minutes, Specimen demonstration and interaction for 20 minutes, Group discussion and group activity for 40 minutes and Presentation by the students- 40 minutes.

The students were given a brief discussion about the topic and then the video was played. The video presentation enhanced the understanding of the topic by the students than the regular board & chalk and the power point methods. The students had a three dimensional view.

The specimens were demonstrated and doubts were clarified as a separate session.

The students were divided into four groups and they were asked to do the chart paper models of larynx. After completion of models each group students were asked to present for ten minutes under the following headings (Figure 12).

Group I- Introduction, extent and cartilages.

Group II- Intrinsic & extrinsic muscles and their actions.

Group III- Structure, nerve supply and blood supply.

Group IV- Vocal cord and its movements.

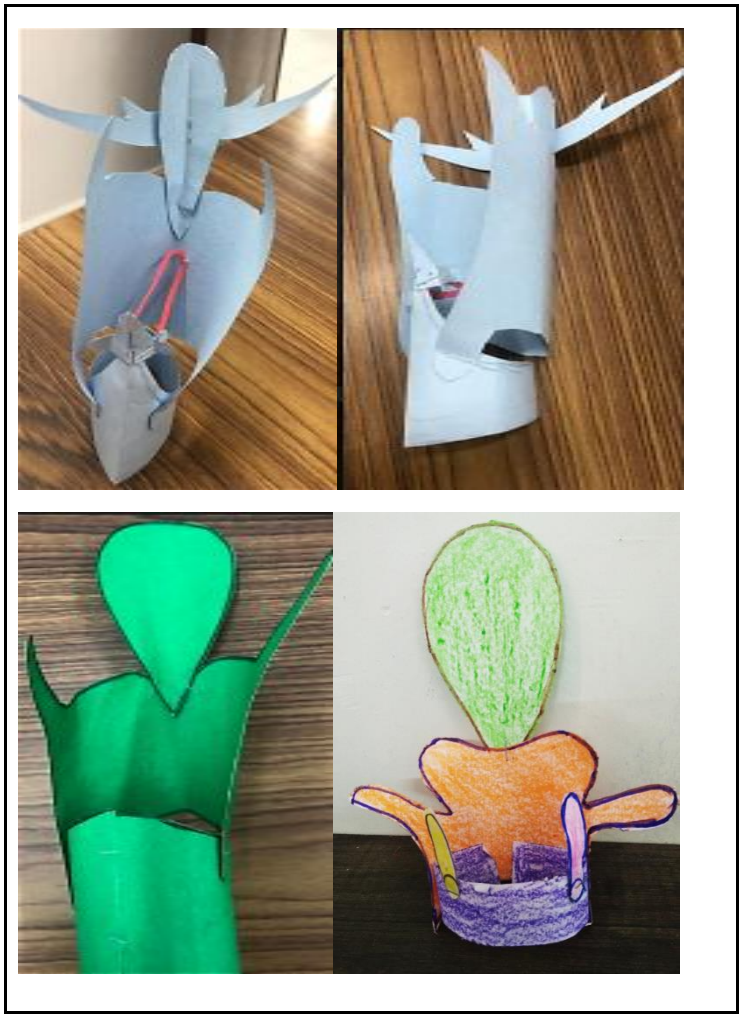

Figure 12: Chart Models of Larynx

At the end of the session, a quiz was conducted and the results showed the students had understood the concept in a better way than the previous teaching methodology. Since they understood the concept and made models of their own constructing cartilages, they were able to remember the shapes and articulation. This method is also a low cost one.

Overall we believe that this method improves the learning of the larynx in a much easier and better way.

CONCLUSION

The above case studies revealed that the students had a better understanding of the subject. In concern with anatomy, they were able to describe the location, appreciate the parts and communications, describe the boundaries and features of different walls, explain the structures passing through them, the content of each structure. They had better understanding about the functions and clinical implications of each structure also. MILA does not hone them academically alone but also their confidence, interactive capabilities, teamwork and innovative thoughts. Since, they enjoy learning the knowledge they gain during such sessions remain deep rooted in the young minds enabling them to be better practitioners in future.

BIBLIOGRAPHY

[1] Gupta, S., Mends, F., Hagiwara, M., Fatterpekar, G. and Roehm, P.C., 2013. Imaging the facial nerve: a contemporary review. Radiology research and practice, 2013.

[2] Ho, M.L., Juliano, A., Eisenberg, R.L. and Moonis, G., 2015. Anatomy and pathology of the facial nerve. American Journal of Roentgenology, 204(6), pp. W612-W619.

[3] Myckatyn, T.M. and Mackinnon, S.E., 2004, February. A review of facial nerve anatomy. In Seminars in plastic surgery (Vol. 18, No. 01, pp. 5-11).Copyright© 2004 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001 US.

[4] Campero A, Campero AA, Martins C, Yasuda A, Rhoton AL. Surgical anatomy of the dural walls of the cavernous sinus. J Clin Neurosci., 2010; 17: 746–750.

[5] Chotai S, Liu Y, Qi S. Review of Surgical Anatomy of the Tumors Involving Cavernous Sinus. Asian J Neurosurg. 2018; 13(1): 1–8.

[6] Mitsuhashi Y, Hayasaki K, Kawakami T, Nagata T, Kaneshiro Y, Umaba R, Ohata K. Dural Venous System in the Cavernous Sinus: A Literature Review and Embryological, Functional, and Endovascular Clinical Considerations. Neurol Med Chir (Tokyo). 2016; 56(6): 326-339.

[7] Zhang, N., & He, X. (2010). Understanding the extraocular muscles and oculomotor, trochlear, and abducens nerves through a simulation in physical examination training: an innovative approach. The Journal of chiropractic education, 24(2), 153–158.

[8] Maini A, Welke L & Nagy G, (2015), Teaching the Extraocular Muscles of the Eye: Construction and Evaluation of a Low-Cost, High-Fidelity Ophthalmoscope for Medical Trainees, The FASEB Journal 29:1 supplement.

[9] Iwanaga, J., Refsland, J., Iovino, L., Holley, G., Laws, T., Oskouian, R.J. and Tubbs, R.S. (2017), A new teaching model for demonstrating the movement of the extraocular muscles. Clin. Anat., 30: 733 -735.

[10] Andrew Pepicelli, Michael Woods, and Christopher Briggs. The mandibular muscles and their importance in orthodontics: A contemporary review Orthod Dentofacial Orthop 2005; 128: 774-80) American Journal of Orthodontics and Dentofacial Orthopedics Volume 128, Number 6.

[11] Susan W. Herring Masticatory muscles and the skull: A Comparative Perspective Arch Oral Biol. 2007 Apr; 52(4): 296–299.

[12] J.H. Koolstra Dynamics of the Human Masticatory System.Crit Rev Oral Biol Med 13(4): 366-376 (2002).

[13] Catlin B, Lyons J, O'Rahilly M, Carpenter S. Basic Human Anatomy. The pharynx and larynx. Dartmouth Medical School. 2008.

[14] De Miranda CM, De Miranda Maranhão CP, Arraes FM, Padilha IG, De Farias LD, De AraujoJatobá MS. Anatomical variations of paranasal sinuses at multislice computed tomography: what to look for. Radiol Bras. 2011; 44: 256-262.

[15] Cappello, Zachary J., and Arthur B. Dublin. "Anatomy, head and neck, nose paranasal sinuses." StatPearls [Internet]. Stat Pearls Publishing, 2018.

[16] Allen E, Murcek BW. Anatomy, Head and Neck, Larynx Recurrent Laryngeal Nerve.

[17] De Bakker BS, De Bakker HM, Soerdjbalie-Maikoe V, Dikkers FG. Variants of the hyoid-larynx complex, with implications for forensic science and consequence for the diagnosis of eagle's syndrome. Scientific reports. 2019 Nov 4; 9(1): 1-0.

[18] Anschuetz L et al, Discovering middle ear anatomy by transcanal endoscopic ear surgery: A dissection manual, Journal of visualized Experiments, 2018 Jan 11; (131).

[19] Matthew J Mason et al, Structure and function of mammalian middle ear II: Inferring function from structure, J Anat. 2016 Feb; 228(2): 300-312.

[20] Daniele Marchioni, et al Endoscopic anatomy of middle ear, Indian journal of otolaryngol head and neck surg. 2011 Apr; 63(2): 101-113.

[21] Patil U, Budihal SV, Siddamal SV, Mudenagudi UK. Activity Based Teaching Learning: An Experience. Journal of Engineering Education Transformations 2016;0. https://doi.org/10.16920/jeet/2016/v0i0/85433.

[22] Rogers DT. The Working Alliance in Teaching and Learning: Theoretical Clarity and Research Implications. International Journal for the Scholarship of Teaching and Learning 2009; 3. https://doi.org/10.20429/ijsotl.2009.030228.

[23] Cummings DJ, Sheeran N. Do academic motivation and personality influence which students benefit the most from peer-assisted study sessions? Psychology Learning & Teaching 2019; 18: 244–58. https://doi.org/10.1177/1475725719840502.

[24] Kanchanamala P, Muppidi S. 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) 2016. https://doi.org/10.1109/iacc.2016.156.