

# Novice and Novel Ecosystem in Pathology Education. A Critical Review of the Evidence

## Running title: Novice and Novel ecosystem in pathology education.

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### Abstract

Introduction: Pathology is a branch of life science concerning the explanation for the origin and nature of disease and tissues examination and the study and diagnosis of the disease. A dental student has built the capability to spot pathological disease. Material and Methods: A questionnaire was prepared which consisted of 10 questions relating to the novice and novel ecosystem in pathology education. The type of questions was close ended. Results: 82.7% of the respondents have attended pathology classes to date while 17.3% have not attended and of the respondents have faced difficulties in understanding the topics in pathology. The chi-square test was analysed for the question association between gender and the respondents who have asked teachers to explain in case of difficulties. The P value = 0.032 [ $p > 0.05$ ]. Conclusion: From this study, it is seen that nearly 82.69% have attended pathology class till date in Saveetha dental college which shows us that the students have good interests in the subject and have taken good records of the classes and have been motivated by their staff to perform in classes too.

**Keywords:** Pathology; tissues; disease; novice ecosystem; motivated, innovative method.

## 1. Introduction

- Highlights:
- A study presents the results of a pilot study on the possible advantages of utilizing a technique supported by drama/role play in developing an understanding of basic ecological concepts utilized in institutions.
- The concept of environmental education is now widespread in national educational policies curriculum documents QCA, 1999], curriculum development initiatives [OECD, 1995], and conservation strategies.
- Recent descriptive studies have highlighted its rapidly expanding size and

increasingly diverse nature, particularly over the last 10 years [7]

- The study aims to understand the opinion on pathology learning among undergraduates and to understand their opinion of pathology learning among the scholars who passed out pathology and to seek out if pathology is a simple subject to review. Allied with this increasing recognition for environmental education has been a concomitant growth within the field of Pathology education research.

## 2. Introduction

Pathology is a branch of life science concerning the explanation for the origin and nature of disease and

tissues examination and the study and diagnosis of the disease. A dental student has built a capability to spot pathological diseases. [1] Pathology plays an important role and features a very unique and diverse field in dentistry. Dental schooling incorporates a mix of moralistic and motor talent learning processes. The elegance of dental college students isn't steady, thanks to considerable variations within the dental prospectus, additional study is suggested by Federation Dental International to offer dentists the knowledge, skills, and attitudes they're going to need in future practice which is vital because these individuals are the long term, dental health providers. [2]

The recent 30 years have visibly developed a worldwide reputation that the challenges associated with environmental degradation and sustainable improvement have vital implications for, and connections with, training and schooling in universities. [3] A study presents the results of a pilot study on the possible advantages of utilizing a technique supported by drama/role play in developing an understanding of basic ecological concepts utilized in institutions. A special study gives the results of an investigation into the notice of a sample of university students and pre-university students have shown a great improvement in their pathology learning as their methods included the art of the ecosystem[4] The last 30 years have seen growing international recognition that the challenges associated with environmental degradation and sustainable development have important implications for, and connections with, education and schooling [5] The concept of environmental education is now widespread in national educational policies curriculum documents [QCA, 1999], curriculum development initiatives [OECD, 1995], and conservation strategies [6] Allied with this increasing recognition for environmental education has been a concomitant growth within the field of Pathology education research. Recent descriptive studies have highlighted its rapidly expanding size and increasingly diverse nature, particularly over the last 10 years [7]

The study aims to understand the opinion on pathology learning among undergraduates and to understand their opinion of pathology learning among the scholars who passed out pathology and to seek out if pathology is a simple subject to review. Our team has extensive knowledge and research experience that has translate into high quality publications [8],[9–22],[23–27]

### 3. Materials and Methods

The survey was conducted among 100 individuals studying in Saveetha dental college and was approved by the institutional review board. The survey was conducted in an online setting using google form

[<https://forms.gle/7dLrVeo1Zkxf8aJ89A>]

convenience method was used. It was done for a period of 30 days of the month of February 2021. A

questionnaire was prepared which consisted of 10 questions relating to the novice and novel ecosystem in pathology education. The type of questions was close ended. Questionnaire validity checking was done by consulting experts. Data collection was done through google sheets and exported to SPSS version 23.

### 4. Statistical Analysis

Data was analysed with SPSS version [23.0] Descriptive statistics as percent were calculated to summarise qualitative data. Chi-square type of analysis was also done to assess the correlation. The results were represented with a pie chart and bar diagram.

### 5. Results

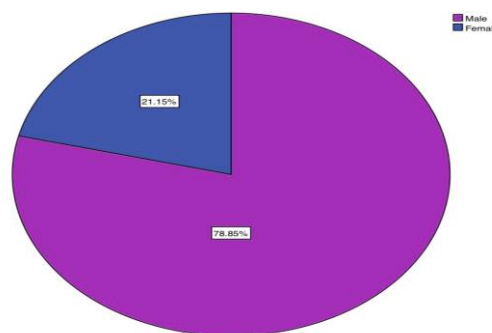


Figure 1: Pie chart showing the distribution of study subjects based on gender. 78.85% of the males and 21.15% of the respondents were females. Purple represents Males and blue represents females.

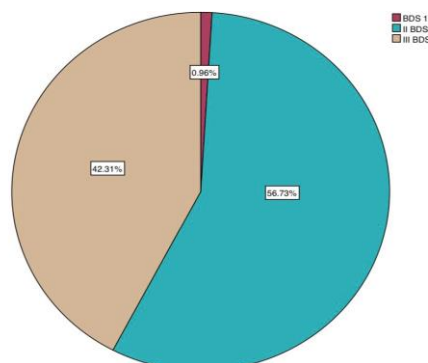


Figure 2: Pie chart showing the distribution of study subjects based on the year of the study. Cedar blue denotes 56.73% of them are II BDS, sandal wood colour denotes 42.31% were III BDS and maroon colour 0.96% were IV BDS.

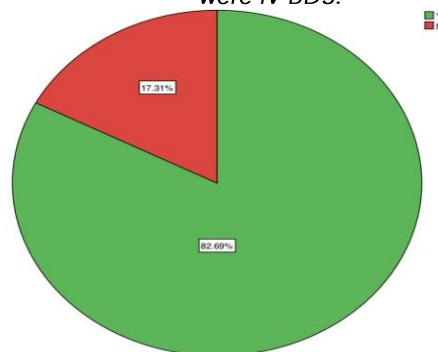


Figure 3: Pie chart showing the percentage of respondents who have attended pathology classes till date, 82.69% have attended pathology classes till date, 17.31% have not attended classes till date.

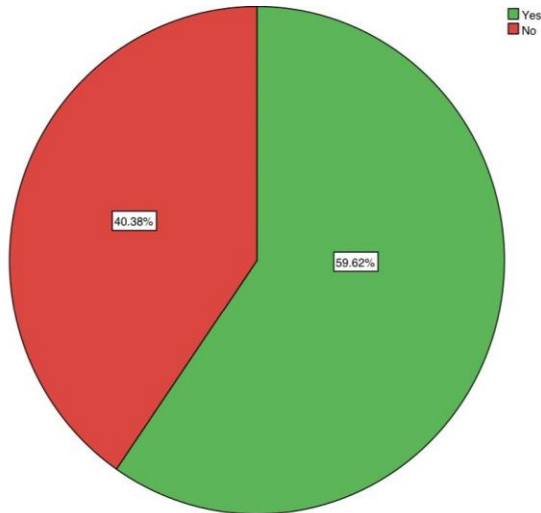


Figure 4: Pie chart representing the percentage of respondents who faced difficulties in understanding the topics in theory classes, 59.62% have faced difficulties and 40.38% have not faced any difficulties.

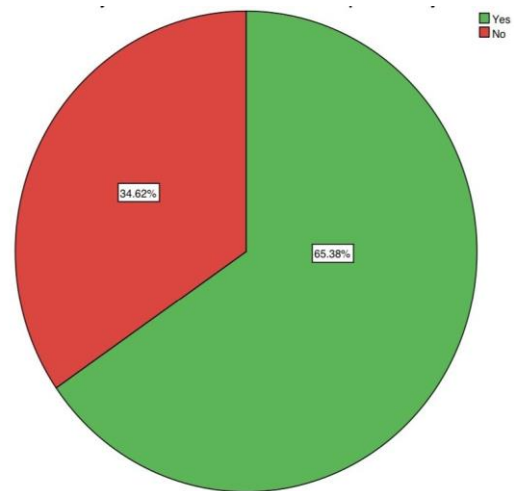


Figure 7: Pie chart representing the percentage of respondents who have made an effort to read the topic before class. 65.38% have made an effort while 34.62% have not made

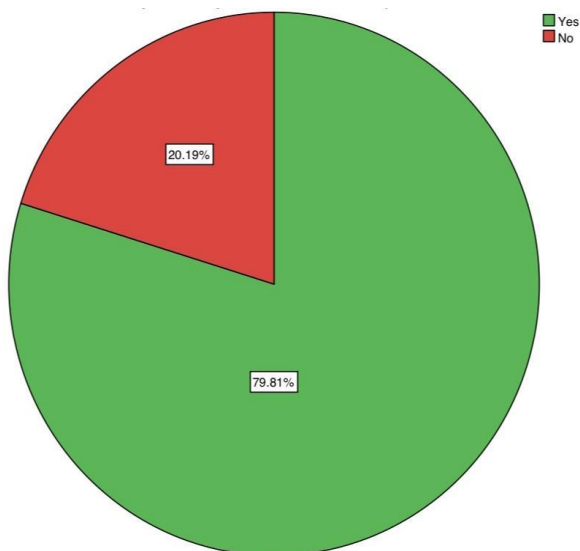


Figure 5: Pie chart representing the percentage of respondents who asked teachers to explain in difficulty in understanding the topics. 79.81% have asked teachers to explain difficulties and 20.19% have not asked.

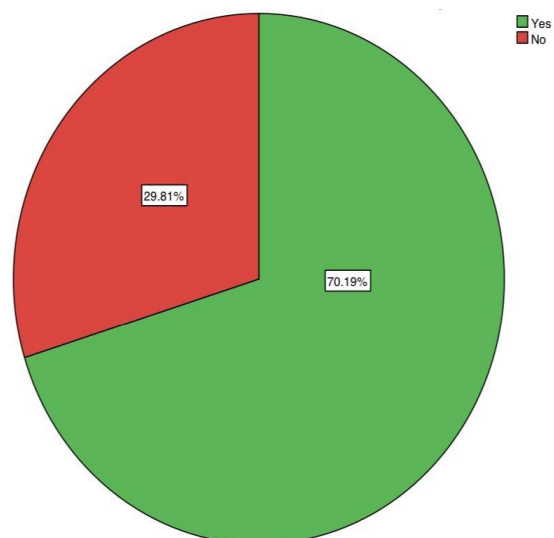


Figure 8: Pie chart representing the percentage of respondents who feel that they can improve their knowledge of motivation, 62.5% responded that they can improve their knowledge when motivated and 37.5% responded that they cannot improve when motivated

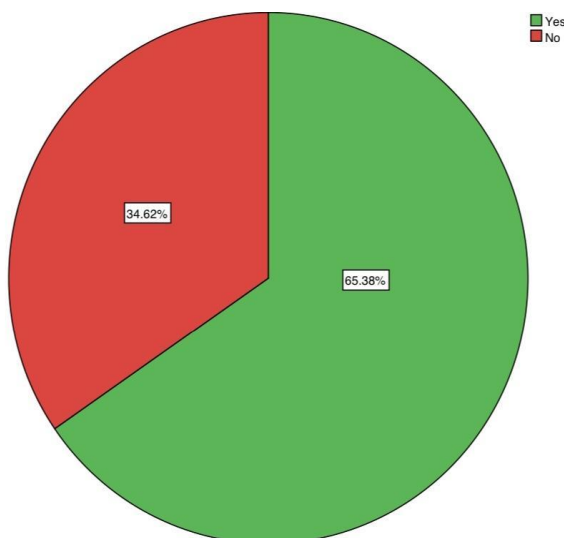


Figure 6: Pie chart representing the percentage of respondents who made record books of their classes. 65.38% have made record books while 34.62% have not made any kind of record.

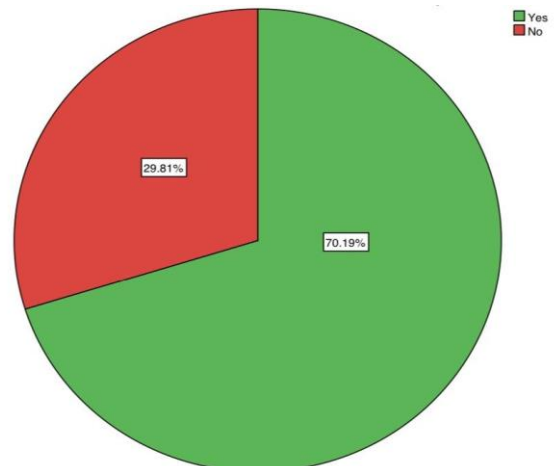


Figure 9: Pie chart representing the percentage of respondents who feel that they can improve their knowledge if there are more interactive sessions with the faculty. 70.19% responded that they can improve their knowledge when there are more interactive sessions and 29.81% responded they cannot improve when there are more interactive sessions.

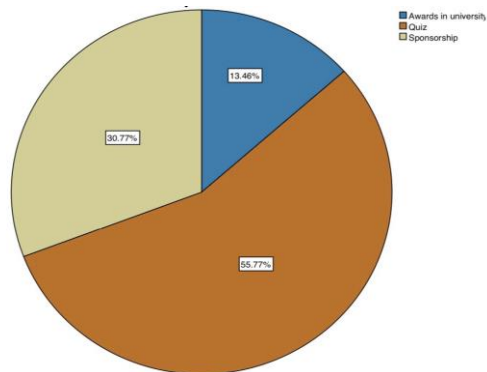


Figure 10: Pie chart representing the percentage of respondents preferring the kind of motivation. 55.7% responded that quiz is a great kind of motivation in learning, 30.77% responded to sponsorship and 13.46% responded that awards in the university have given them great motivation.

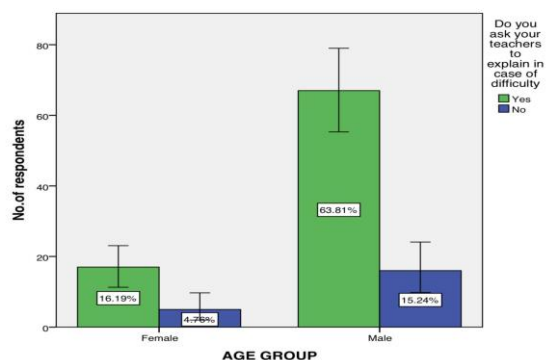


Figure 11: This graph depicts the association between gender and the respondents who have asked teachers to explain in case of difficulties. The X-axis represents the gender of the respondents Y-axis represents the number of respondents who have asked teachers to explain during difficulties. The green bar represents the respondents who have asked teachers to explain during difficulties, Red bar represents the respondents who have not asked teachers. The males have asked teachers to explain during difficulties more than females. The chi-square test was analysed P value= 0.032 [p > 0.05] which is statistically not significant.

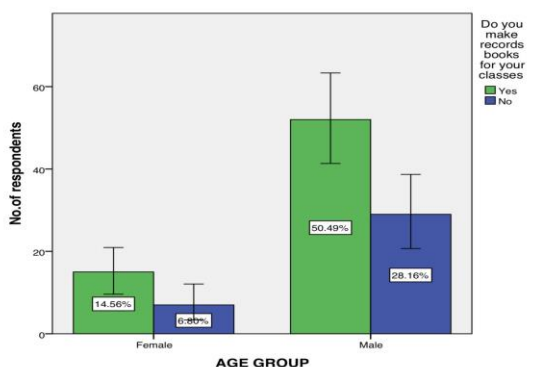


Figure 12: This bar graph depicts the association between gender and the respondents who have made a record in their classes. The X-axis represents the gender of the respondents Y-axis represents the number of respondents who have made records in their classes. The green bar represents the respondents who have made records in their class Red bar represents the respondents who have not made records. The males have made more records than females. The chi-square test was analysed P value= 0.032 [p > 0.05] which is statistically not significant.

From the survey conducted, the following results were obtained. Figure 1 shows 78.8% were male and 21.2% were Female. Figure 2 shows 57.3% of the respondents were 2nd year BDS students 41.7% of the respondents were 3rd-year students. [Figure 3] 82.7% of the respondents have attended pathology classes to date while 17.3% have not attended From previous studies identifies problems and challenges arising from the recent proof that the study conducted in New York on pathology education nearly 60% of the students have not attended classes and nearly 0.5% have not attended one class to till date [28]

Figure 4 shows 59.62% of the respondents have faced difficulties in understanding pathology topics and 40.38% have not faced any difficulties. A study was done in Hong Kong[29] was found that pathology topics when taken for a long time the students have faced difficulties on a large scale as their understanding and memory skill in the subject has decreased [[30]]

Figure 5 shows 79.8% of the respondents have asked the teachers to explain when they have not understood the topic but 20.2% have not asked them to repeat their lecture. The teaching of scientific explanations can hinder young people in their efforts to make sense of pathology topics in their daily lives, and hence teaching through methods of quiz in which this idea emerges from a recent study of 90 Canadian college students conducted by the methods oral pathology was taught to them [31].

Figure 6 shows 64.7% of the respondents have made proper records of the classes taken, 35.3% have not taken any kind of records in class. However, in a study of college students' ideas about cancer and their inhabitants, gender differences were only found with two parameters, and it was concluded that boys do possess more knowledge than girls related to pathology topics. [32] Figure7 shows 65.4% of the respondents haven't made an effort to read the topic before class and 34.6% have not made the effort. In Boyes and Stanisstreet study, girls were found to have better factual knowledge than boys of the well-known topics under cancer and lymphomas [33], and a study conducted of 100 in class nearly 60% of the girls have read the topic before their lecture and come prepared. [34]

Figure 8 shows 64.1% of the respondents feel that more theory classes should be arranged than usual while 35.9% felt that there should be fewer theory classes. Figure 9 shows 62.5% of the individuals feel that they can improve in studies if they are motivated while 37.5% have no interest even when motivated. Figure 10 shows 56.9% of the respondents feel pathology education can lead to great success in quiz competition while 29.4% feel that it can lead to sponsorship and 13.7% have received awards in universities. Figure 11 depicts the association between gender and the respondents who have asked teachers to explain in case of difficulties. The X-axis represents the gender of the respondents Y-

axis represents the number of respondents who have asked teachers to explain during difficulties. The chi-square test was analysed P value = 0.032 [ $p > 0.05$ ] Figure 12 bar graph depicts the association between gender and the respondents who have made a record in their classes. The X-axis represents the gender of the respondents Y-axis represents the number of respondents who have made records in their classes.

From this study, we can see that pathology education is promoted by quiz completions and also awards by the university, which are indications that young people's pathology information comes from several sources, the two most important of which are quiz and college teaching. [35] There is strong evidence across several studies that quizzes are the major source of young people's pathology education. In their survey of young people in the US, for example, they reported that a list of 14 possible sources of information about pathology education stands out. [36]. The limitations of the study was that it was done in a small population among the students of Saveetha dental college. As time passes by, the teaching methods to enhance the minds of the students who learn pathology have also been improving which helps them excel in academics. Future studies can be done to overcome this limitation.

## 6. Conclusion

From this study, it is seen that nearly 82.69% have attended pathology class till date in Saveetha dental college which shows us that the students have good interests in the subject and have taken good records of the classes and have been motivated by their staff to perform in classes too.

## 7. Acknowledgement

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## 8. Conflict Of Interest

The authors would like to declare no conflict of interest in the present study.

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## References

1. Longworth N. Strategies for the learning city – celebrating and rewarding learning [Internet]. Making Lifelong Learning Work. 2019. p. 183–6.
2. Terao K. Mycotoxin Research from Standpoint of Pathology Liver Injuries Induced by Aflatoxins and Sterigmatocystin [Internet]. Vol. 1979, Mycotoxins. 1979. p. 10–2.
3. Uluyol Ç. Augmented Reality in Education [Internet]. Education. 2019.
4. United States. Health Resources Administration. Division of Associated Health Professions. Allied Health Education Programs in Junior and Senior Colleges, 1975. 1978\*.
5. Taylor RW. The Pathology and Treatment of Venereal Diseases [Internet]. Vol. 112, The American Journal of the Medical Sciences. 1896. p. 71–82.
6. Collins LC. Breast Pathology, an Issue of Surgical Pathology Clinics, E-Book. Elsevier; 2018.
7. Scorovilli F. Pathology and Genetics of Tumours of the Nervous [Internet]. Vol. 19, Cephalalgia. 1999. p. 70-75.
8. Anita R, Paramasivam A, Priyadharsini JV, Chitra S. The m6A readers YTHDF1 and YTHDF3 aberrations associated with metastasis and predict poor prognosis in breast cancer patients. Am J Cancer Res. 2020 Aug 1;10[8]:2546–54.
9. Jayaseelan VP, Paramasivam A. Emerging role of NET inhibitors in cardiovascular diseases. Hypertens Res. 2020 Dec;43[12]:1459–61.
10. Sivakumar S, Smiline Girija AS, Vijayashree Priyadharsini J. Evaluation of the inhibitory effect of caffeic acid and gallic acid on tetR and tetM efflux pumps mediating tetracycline resistance in *Streptococcus* sp., using computational approach. Journal of King Saud University - Science. 2020 Jan 1;32[1]:904–9.
11. Smiline Girija AS. Delineating the Immuno-Dominant Antigenic Vaccine Peptides Against *gacS*-Sensor Kinase in *Acinetobacter baumannii*: An in silico Investigational Approach. Front Microbiol. 2020 Sep 8; 11: 2078.
12. Iswarya Jaisankar A, Smiline Girija AS, Gunasekaran S, Vijayashree Priyadharsini J. Molecular characterisation of *csgA* gene among ESBL strains of *A. baumannii* and targeting with essential oil compounds from *Azadirachta indica*. Journal of King Saud University - Science. 2020 Dec 1;32[8]:3380–7.
13. Girija ASS. Fox3+ CD25+ CD4+ T-regulatory cells may transform the nCoV's final destiny to CNS! J Med Virol [Internet]. 2020 Sep 3; Available from: <http://dx.doi.org/10.1002/jmv.26482>
14. Jayaseelan VP, Ramesh A, Arumugam P. Breast cancer and DDT: putative interactions, associated gene alterations, and molecular pathways. Environ Sci Pollut Res Int. 2021 Jun;28[21]:27162–73.
15. Arumugam P, George R, Jayaseelan VP. Aberrations of m6A regulators are associated with tumorigenesis and metastasis in head and neck squamous cell carcinoma. Arch Oral Biol. 2021 Feb; 122: 105030.
16. Kumar SP, Girija ASS, Priyadharsini JV.

Targeting NM23-H1-mediated inhibition of tumour metastasis in viral hepatitis with bioactive compounds from *Ganoderma lucidum*: A computational study. *pharmaceutical-sciences* [Internet]. 2020;82[2]:78–83.

17. Girija SA, Priyadharsini JV, Paramasivam A. Prevalence of carbapenem-hydrolyzing OXA-type  $\beta$ -lactamases among *Acinetobacter baumannii* in patients with severe urinary tract infection. *Acta Microbiol Immunol Hung*. 2019 Dec 9;67[1]:49–55.
18. Priyadharsini JV, Paramasivam A. RNA editors: key regulators of viral response in cancer patients. *Epigenomics*. 2021 Feb;13[3]:165–7.
19. Mathivadani V, Smiline AS, Priyadharsini JV. Targeting Epstein-Barr virus nuclear antigen 1 [EBNA-1] with *Murraya koengii* bio-compounds: An in-silico approach. *Acta Virol*. 2020;64[1]:93–9.
20. Girija As S, Priyadharsini J V, A P. Prevalence of Acb and non-Acb complex in elderly population with urinary tract infection [UTI]. *Acta Clin Belg*. 2021 Apr;76[2]:106–12.
21. Anchana SR, Girija SAS, Gunasekaran S, Priyadharsini VJ. Detection of *csgA* gene in carbapenem-resistant *Acinetobacter baumannii* strains and targeting with *Ocimum sanctum* biocompounds. *Iran J Basic Med Sci*. 2021 May;24[5]:690–8.
22. Girija ASS, Shoba G, Priyadharsini JV. Accessing the T-Cell and B-Cell Immuno-Dominant Peptides from *A.baumannii* Biofilm Associated Protein [bap] as Vaccine Candidates: A Computational Approach. *Int J Pept Res Ther*. 2021 Mar 1;27[1]:37–45.
23. Arvind P TR, Jain RK. Skeletally anchored forsus fatigue resistant device for correction of Class II malocclusions-A systematic review and meta-analysis. *Orthod Craniofac Res*. 2021 Feb;24[1]:52–61.
24. Venugopal A, Vaid N, Bowman SJ. Outstanding, yet redundant? After all, you may be another *Choluteca* Bridge! *Semin Orthod*. 2021 Mar 1;27[1]:53–6.
25. Ramadurai N, Gurunathan D, Samuel AV, Subramanian E, Rodrigues SJL. Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial. *Clin Oral Investig*. 2019 Sep;23[9]:3543–50.
26. Varghese SS, Ramesh A, Veeraiyan DN. Blended Module-Based Teaching in Biostatistics and Research Methodology: A Retrospective Study with Postgraduate Dental Students. *J Dent Educ*. 2019 Apr;83[4]:445–50.
27. Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless-steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial [Internet]. Vol. 24, *Clinical Oral Investigations*. 2020. p. 3275–80.
28. Yurova MN, Tyndyk ML, Popovich IG, Golubev AG, Anisimov VN. [Gender-specific effects of neonatal administration of melatonin on

lifespan and age-associated pathology in 129/Sv mice.]. *Adv Gerontol*. 2019;32[1-2]:66–75.

29. Sohn YW, Doane SM. Roles of working memory capacity and long-term working memory skill in complex task performance [Internet]. Vol. 31, *Memory & Cognition*. 2003. p. 458–66.
30. Working Memory Capacity and Musical Skill [Internet]. *Working Memory*. 2013. p. 151–70.
31. Southard D. Bimanual Movement, Memory, and Skill Acquisition [Internet]. *Advances in Psychology*. 1985. p. 285–94.
32. Wästerlid T, Jonsson B, Hagberg H, Jerkeman M. Population based study of prognostic factors and treatment in adult Burkitt lymphoma: a Swedish Lymphoma Registry study [Internet]. Vol. 52, *Leukemia & Lymphoma*. 2011. p. 2090–6.
33. Moineau-Vallée K, Rinfret J, Luu Hoai MH, St-Louis V, Berthelet F, Létourneau-Guillon L, et al. Successful Management of Natalizumab-Associated Primary Central Nervous System Lymphoma through Autologous Stem Cell Transplant. *Curr Oncol*. 2020 Dec 30;28[1]:203–8.
34. Maloney DG. Graft-vs.-Lymphoma Effect in Various Histologies of Non-Hodgkin's Lymphoma [Internet]. Vol. 44, *Leukemia & Lymphoma*. 2003. p. S99–105.
35. Leonard JP. Hodgkin's and Non-Hodgkin's Lymphoma. 2006. 471 p.
36. Klopfenstein L, Bogliolo A. THE QUIZ-MASTER BOT: A PERSISTENT AUGMENTED QUIZ DELIVERED THROUGH ONLINE MESSAGING [Internet]. *INTED2017 Proceedings*. 2017.