

Awareness Of 3d Interactive Tooth Atlas

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ABSTRACT

INTRODUCTION: The advances in technology offered innovations to assist faculty by helping students to learn new information and also develop new skills. One such technology is the 3D interactive tooth atlas. This provides a comprehensive database of human dentition. This kind of atlas could be added to the school's vital book. Accordingly, the goal of this study is to analyse the awareness of 3D interactive tooth atlas among dental students.

MATERIALS AND METHODS: Survey was conducted through google forms and circulated to all dental students of various institutions. Using the google forms, the responses which were received were tabulated and the graphs are represented graphically using SPSS software. Pearson chi square test was done and p value was obtained.

RESULT: The results were collected and analysed in the end. In the association between the gender and usage of 3D tooth atlas. Both males and females responded. Pearson chi square test shows p value is 0.834, (p value > 0.05) is statistically not significant. In the association between the age and whether 3D tooth atlas is easier to access to learn materials than the traditional lectures and books. Pearson chi square test shows p value is 0.134, (p value > 0.05) is statistically not significant. In the association between the level of education and whether 3D tooth atlas is a useful tool. Pearson chi square test shows p value is 0.020, (p value < 0.05) is statistically significant.

CONCLUSION: This study is to create an awareness of 3D interactive tooth atlas among dental students. Introduction of these technologies in classrooms other than traditional lectures and books make students easy to learn and develop 3D visualisation skills.

KEY WORDS: 3D interactive tooth atlas, learning skills, 3D skills, technologies, novel method, innovative technology

INTRODUCTION

Advances in technology provide innovations and assist faculty to help students learn new information or develop new skills.(1) This tool provides a comprehensive database of human dentition. It enhances student enthusiasm and motivation. Improves learning outcomes and speed of learning.(2) (3). Anytime, anywhere access to educational materials by students is possible and it provides students with better imagery and visualisation. 2D and 3D interactive media technology is available for implementation into curricula to teach the next-generation.(4) (5)(6)

According to the previous research done on this topic, 3D interactive tooth atlas improves learning outcome which allows high fidelity simulation. This makes faculties less lecture based and more problem / issue centered (1,7). 3D tooth atlas is not aware of all since it is one of the complex methods. Many kinds of software programs are available to provide students with an interactive data set (8) (9). Students are able to select from multiple types of tooth anatomy and study them from different directions (10,11). These are of great benefit, especially for training in invasive procedures (12) (13) This tool is however expensive and not available for personal use.This allows to generate an efficient complete 3D reconstruction of teeth with a good approximation of the shape and requires little interaction from the user (14) (15).

This research is necessary to learn easily by 3D interactive tooth atlas. This provides students with greater familiarity with the procedures before working on patients (10). It has more opportunities to enhance their skills(1,7). It's comfortable to practise the procedure endlessly on the computer (2) (16). Although these tools help students to understand the complexity of dental anatomy, they are still considered a passive approach (17). Our team has extensive knowledge and research experience that has translate into high quality publications

(3),(5),(9),(15),(16),(17),(18),(13),(10),(11),(19),(20),(21),(22),(23),(24),(25),(26),(27),(28). The main aim of the study is to create awareness of innovative technology of 3D interactive tooth atlas among dental students and faculty and to identify the topics (knowledge and skills) that would benefit from having a 3D interactive tooth atlas.

MATERIALS AND METHODS

This study was conducted with 170 dental students residing at various institutions after getting approval from SRB Saveetha Dental College. These samples were selected based on the inclusion and exclusion criteria. Inclusion criteria includes dental students of age 18 to 25 residing in different colleges. Exclusion criteria includes other professionals except dentists.

A self structured questionnaire was prepared and uploaded in the Google forms. This standard questionnaire in Google forms is being circulated among the sample study population of dental students and faculties. Nearly 10 questionnaires were sent and got 170 responses. The questionnaire consisting of 10 questions was created by a pathologist and was reviewed by another author, validated and circulated. At the end it assessed their knowledge and attitude towards 3D tooth atlas. Around 170 responses were received and these were tabulated and the graphs represented graphically using SPSS software. Pearson chi square test was done and p value was obtained.

The questionnaire comprised a series of questions including their demographic characteristics like age, gender and level of education. The other questions are as follows :

- Have you used 3D tooth atlas
- Do you think it was a useful tool
- Did it encourage you to participate actively in the class
- Can it be used outside the class
- Does 3D tooth atlas help to develop 3D visualisation skills
- Does it provide easier access to learn materials than the traditional lectures and books
- Does it help to prepare for clinical applications of tooth morphology
- Did it improve enthusiasm and motivation towards learning
- How will you rate the videos available in 3D tooth atlas
- Did it provide any other information other than needed

RESULTS

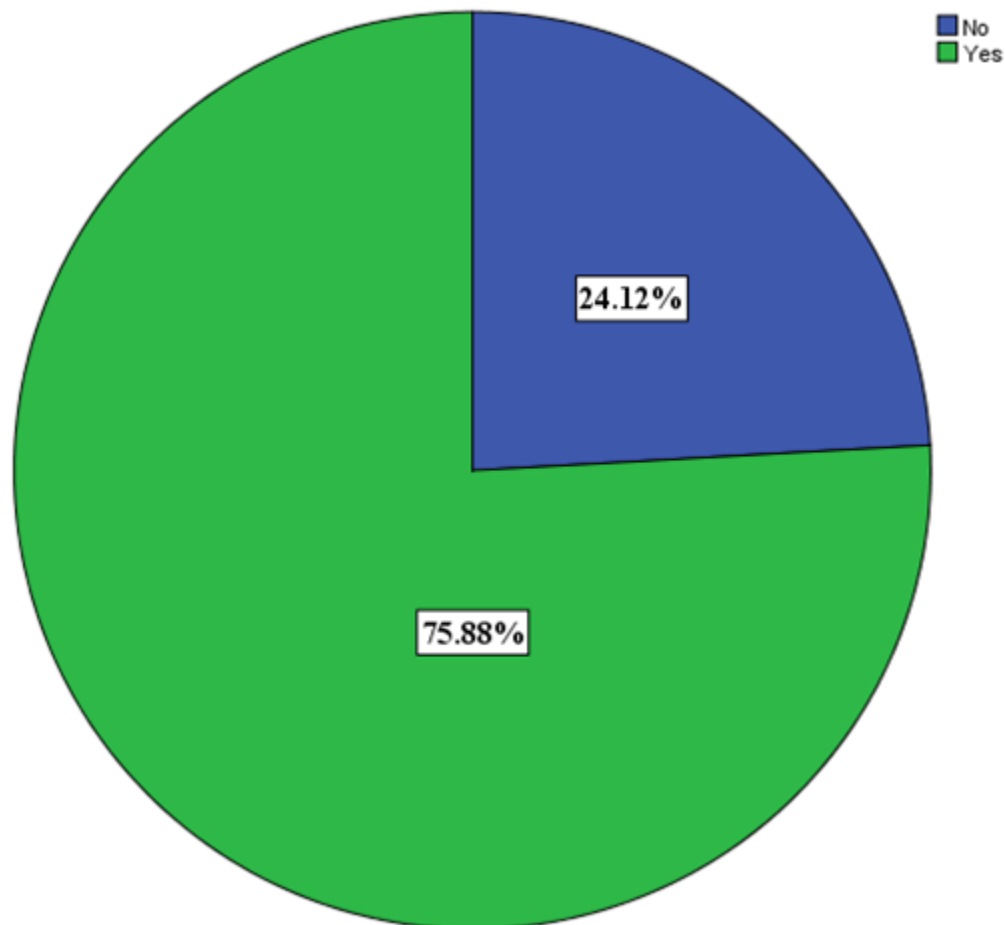


FIGURE 1 : Shows the response of the amount of usage of 3D tooth atlas. 75.88% of participants (green colour) have used 3D tooth atlas and 24.12% of participants (blue colour) haven't used 3D tooth atlas. Majority of the students have used the 3D Interactive Tooth Atlas.

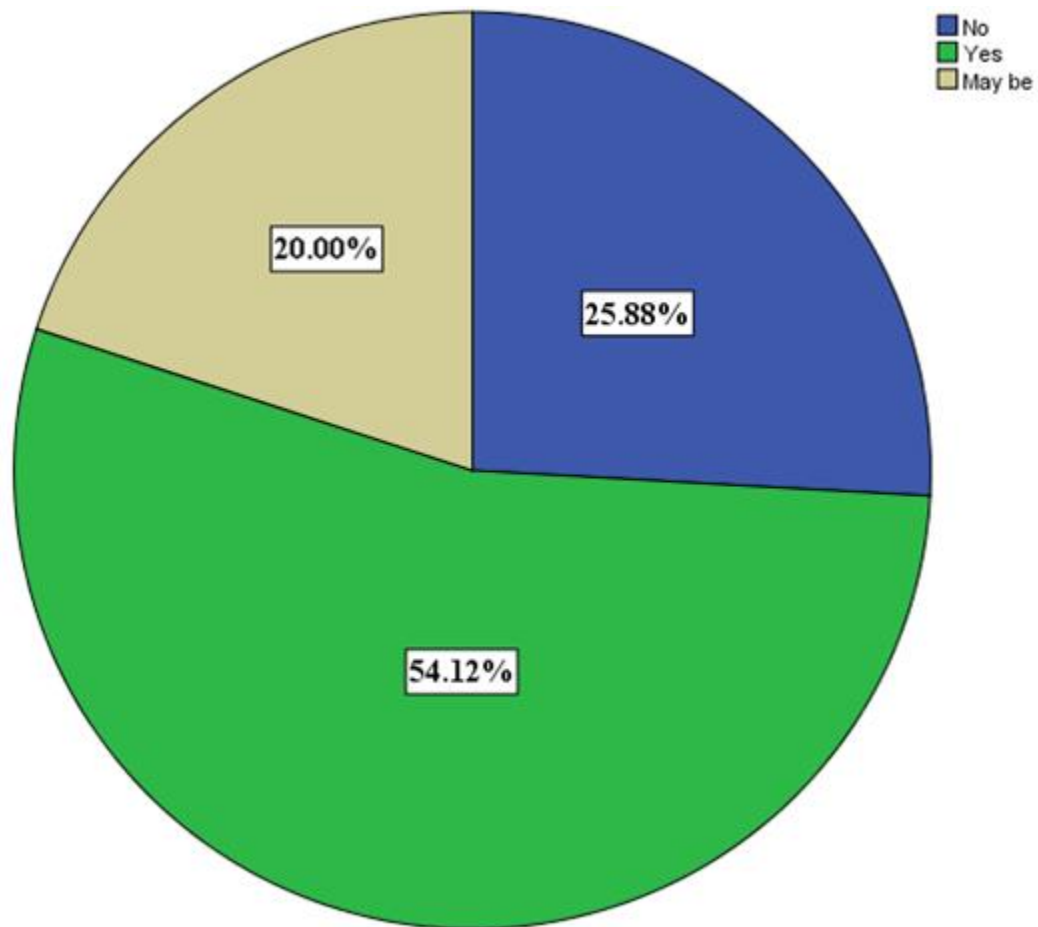


FIGURE 2: Shows the response of the amount of usage of this tool. 54.12% of participants (green colour) said that this is a useful tool. 25.88% (blue colour) responded that this is not a useful tool. 20% (beige colour) responded that it may be useful. Majority of the participants think that the 3D Interactive Tooth Atlas is a useful tool.

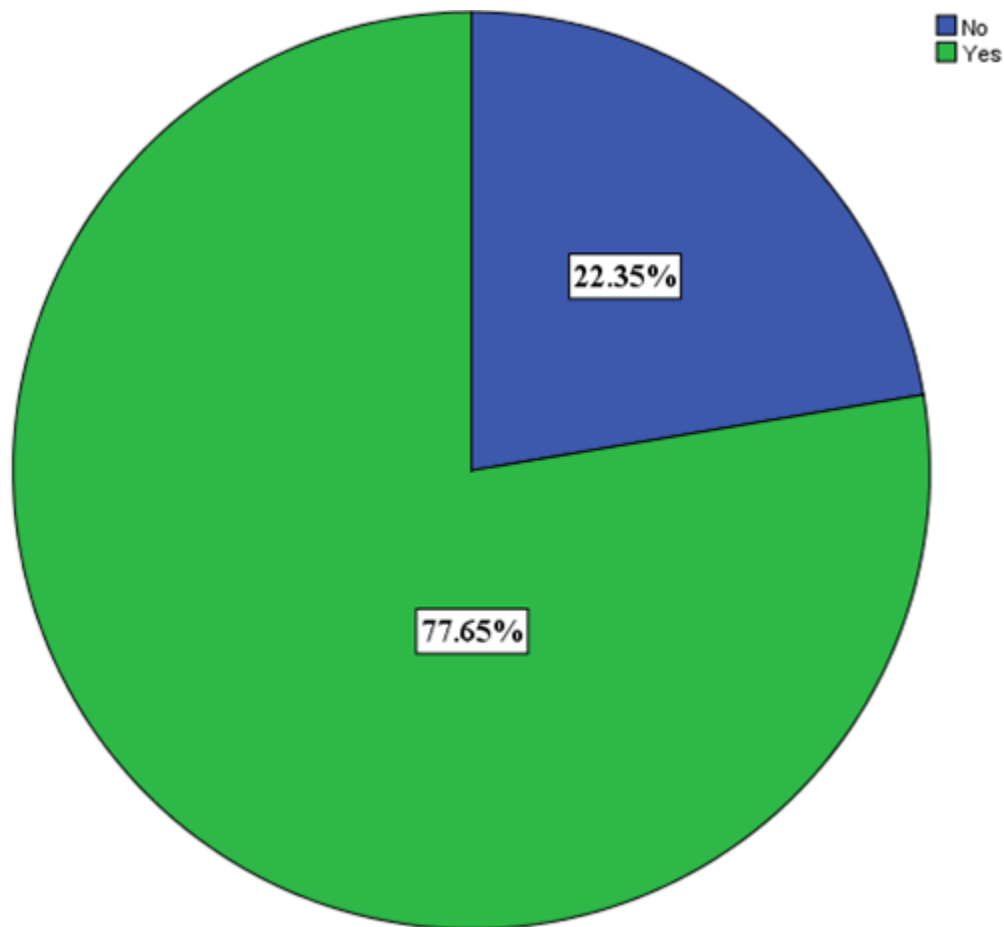


FIGURE 3: Shows the response of the amount of participants who got encouraged and participated actively in class. 77.65% (green colour) responded that they participated actively in the class and 22.35% (blue colour) responded they didn't participate actively in the class. Majority of the participants said that they were able to participate actively in the class.

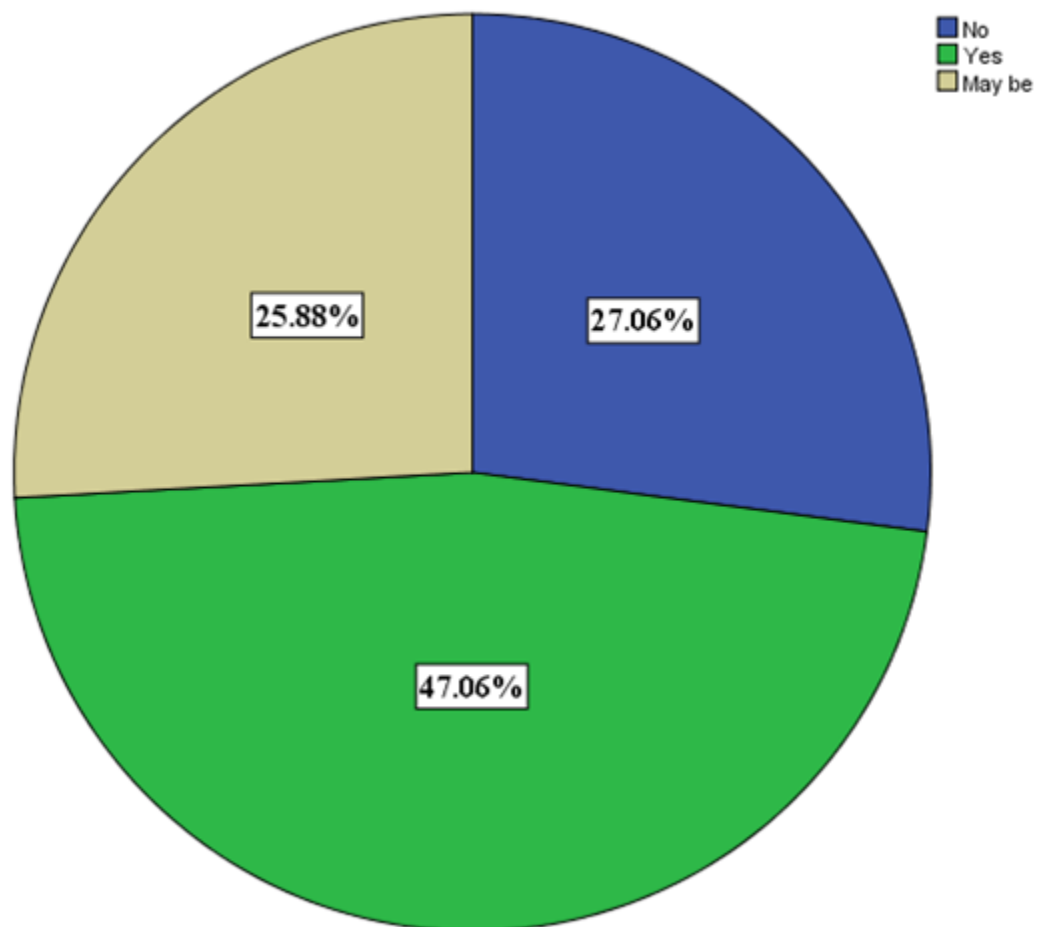


FIGURE 4: Shows the response of usage of this tool outside the class. 27.06% (blue colour) responded that the tool can't be used outside the class, 47.06% (green colour) responded that the tool can be used. Majority of the participants think that it can't be used outside the class.

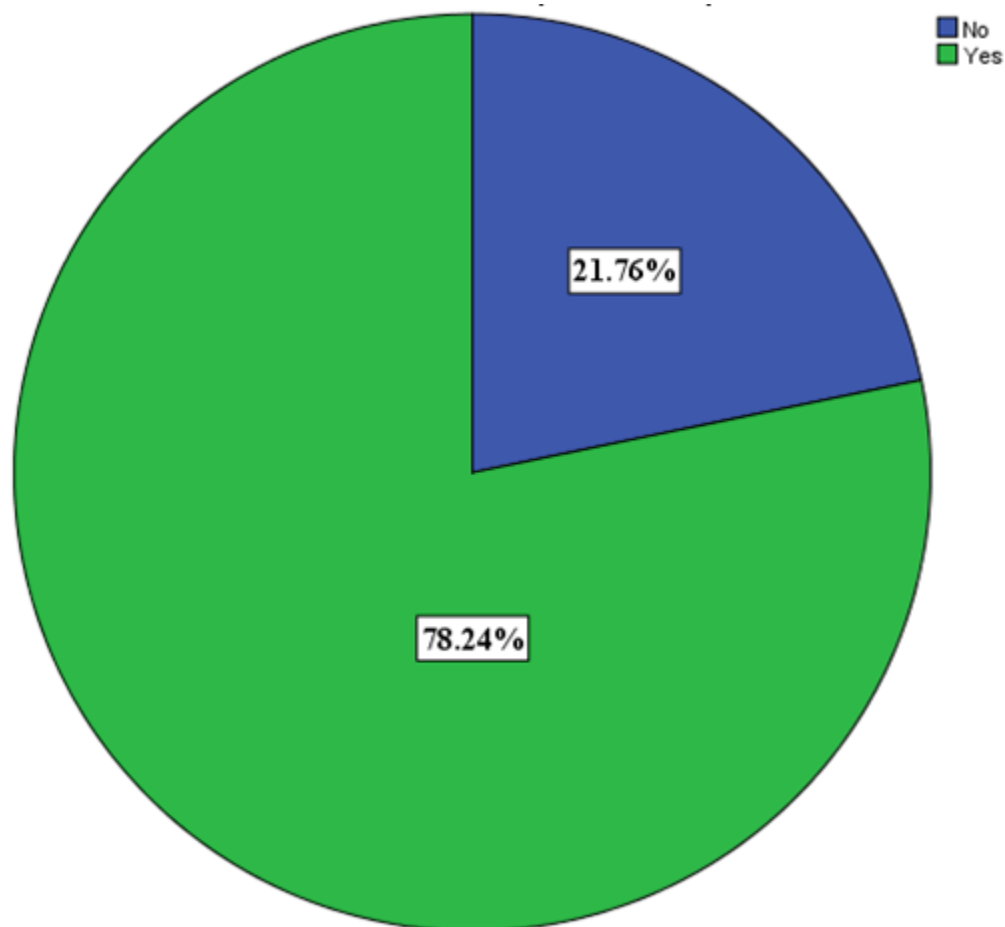


FIGURE 5: Shows the response of 3D atlas helping to develop 3D visualization skills. 78.24% (green colour) responded that the tool helped to develop 3D visualization skills and 21.76% (blue colour) responded that the tool didn't help to develop 3D visualization skills. Majority of the participants think that this tool helped to develop 3D visualization skills.

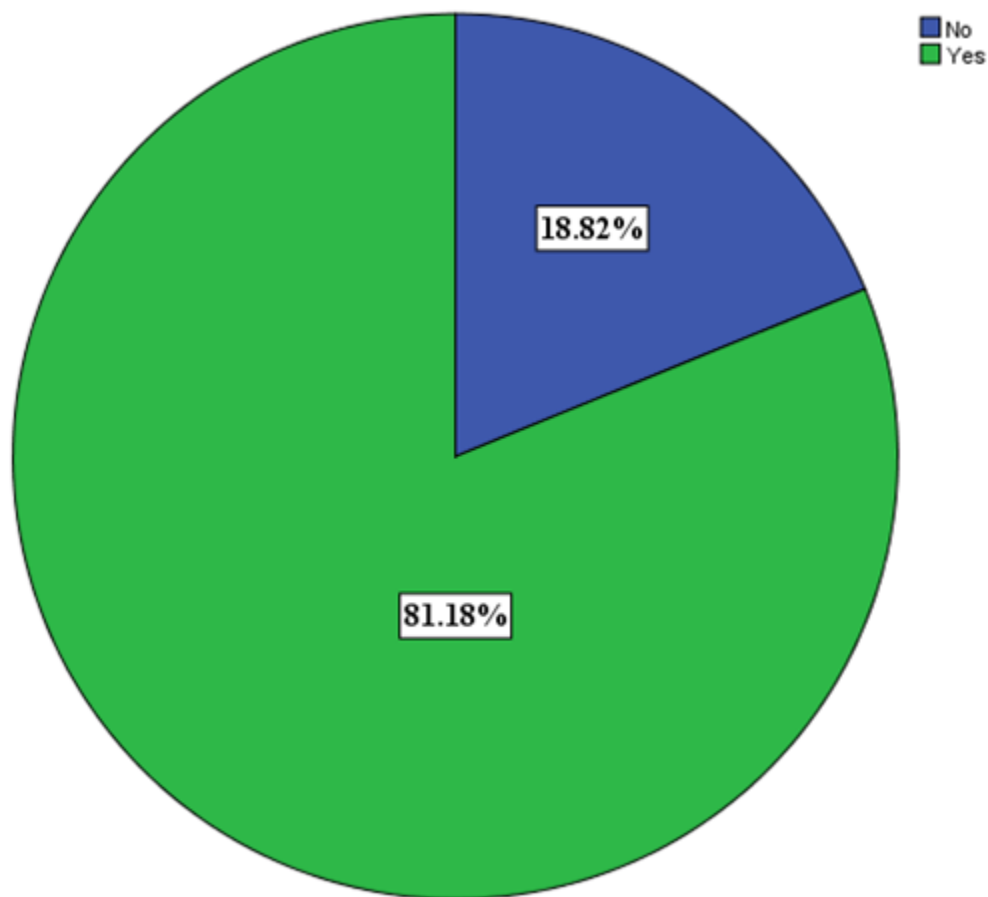


FIGURE 6: Shows the responses on this tool whether it provided easier access to learn materials than traditional lectures and books. 81.18% (green colour) responded that this tool provided easier access to learn whereas 18.82% (blue colour) responded that this tool didn't provide easier access to learn. Majority of the participants think that this tool provides easier access to learning materials than traditional lectures and books.

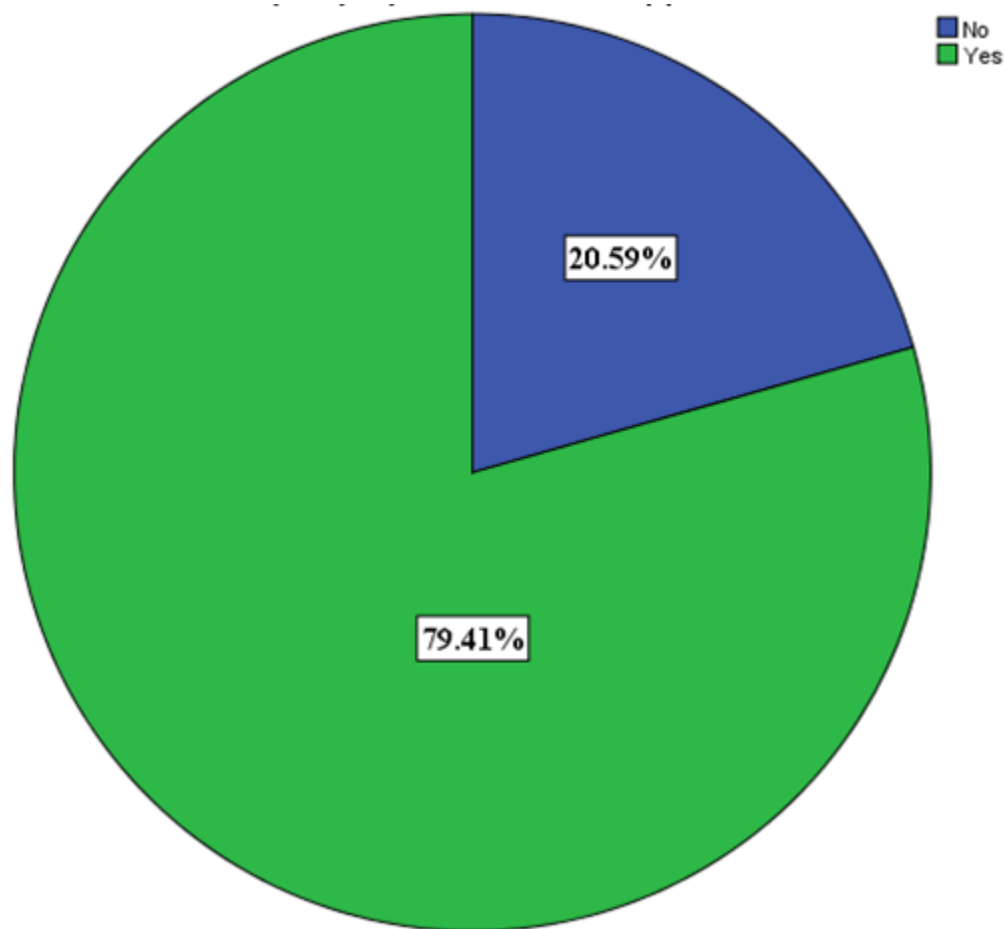


FIGURE 7: Shows the responses of helping students to prepare for clinical applications of tooth morphology. 79.41% (green colour) responded that this tool helped students to prepare for clinical applications of tooth morphology whereas 20.59% (blue colour) responded that this tool didn't help students to prepare for clinical applications of tooth morphology. Majority of the participants think that this tool helped students to prepare for clinical applications of tooth morphology.

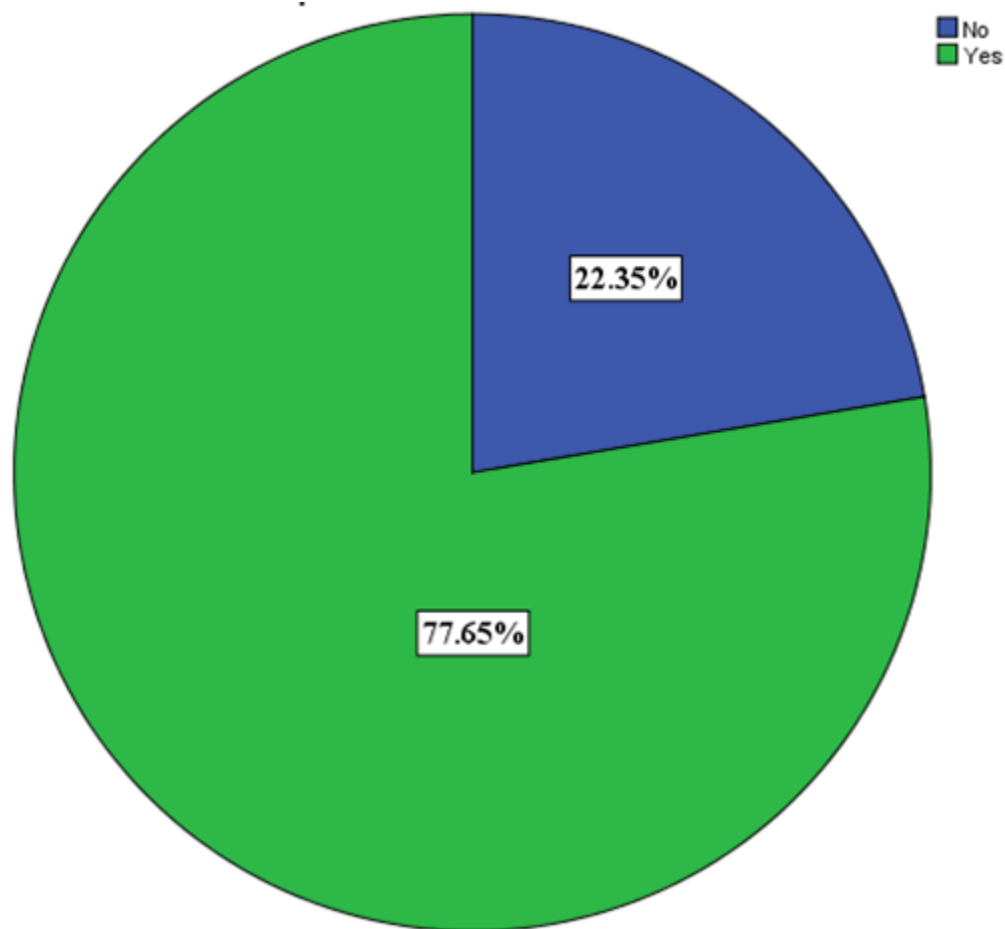


FIGURE 8: Shows the responses of students' enthusiasm and motivation towards learning. 77.65% (green colour) responded that this improved students' enthusiasm and motivation towards learning whereas 22.35% (blue colour) responded that this didn't improve students' enthusiasm and motivation towards learning. Majority of the population think that this tool improves students' enthusiasm and motivation towards learning.

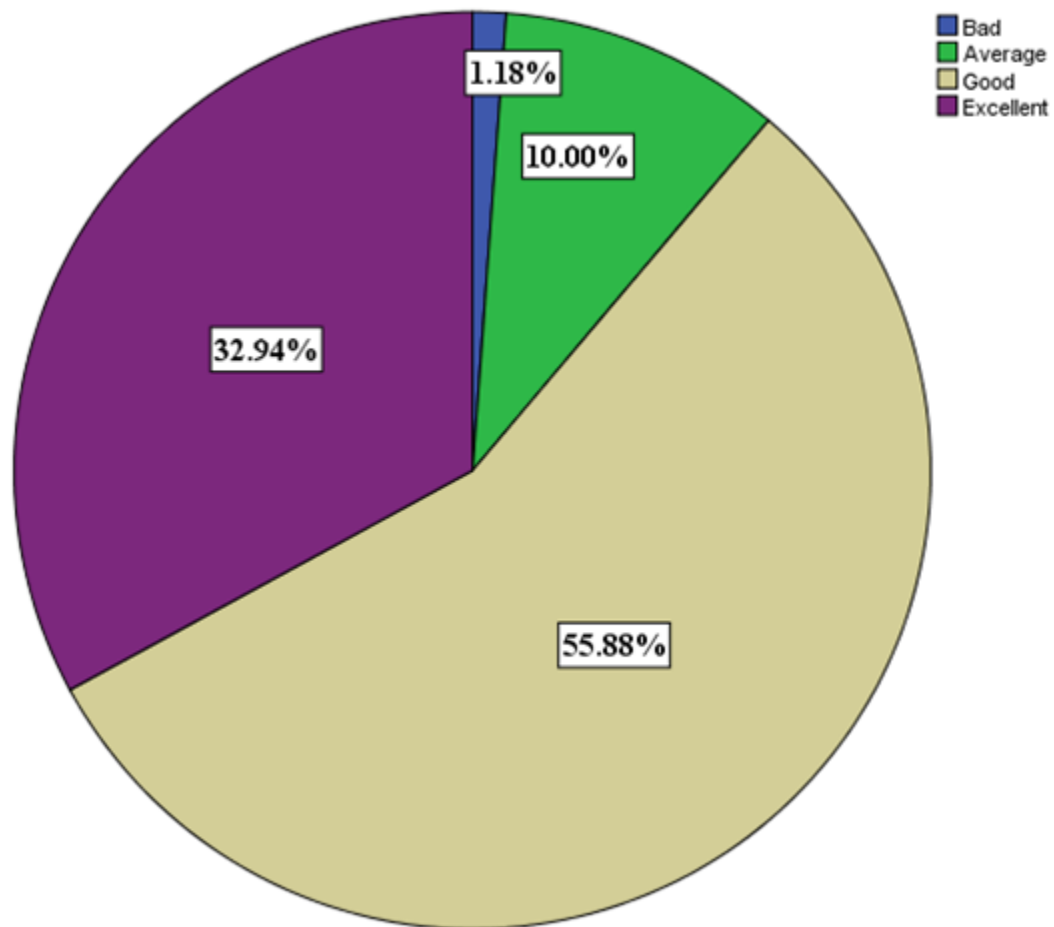


FIGURE 9: Shows the responses of rating the videos in 3D tooth atlas. 1.18% (blue colour) responded bad, 10% (green colour) responded average, 55.88% (beige colour) responded good and 32.94% (purple colour) responded excellent. Majority of the population think that the videos in the 3D Interactive Tooth Atlas are good.

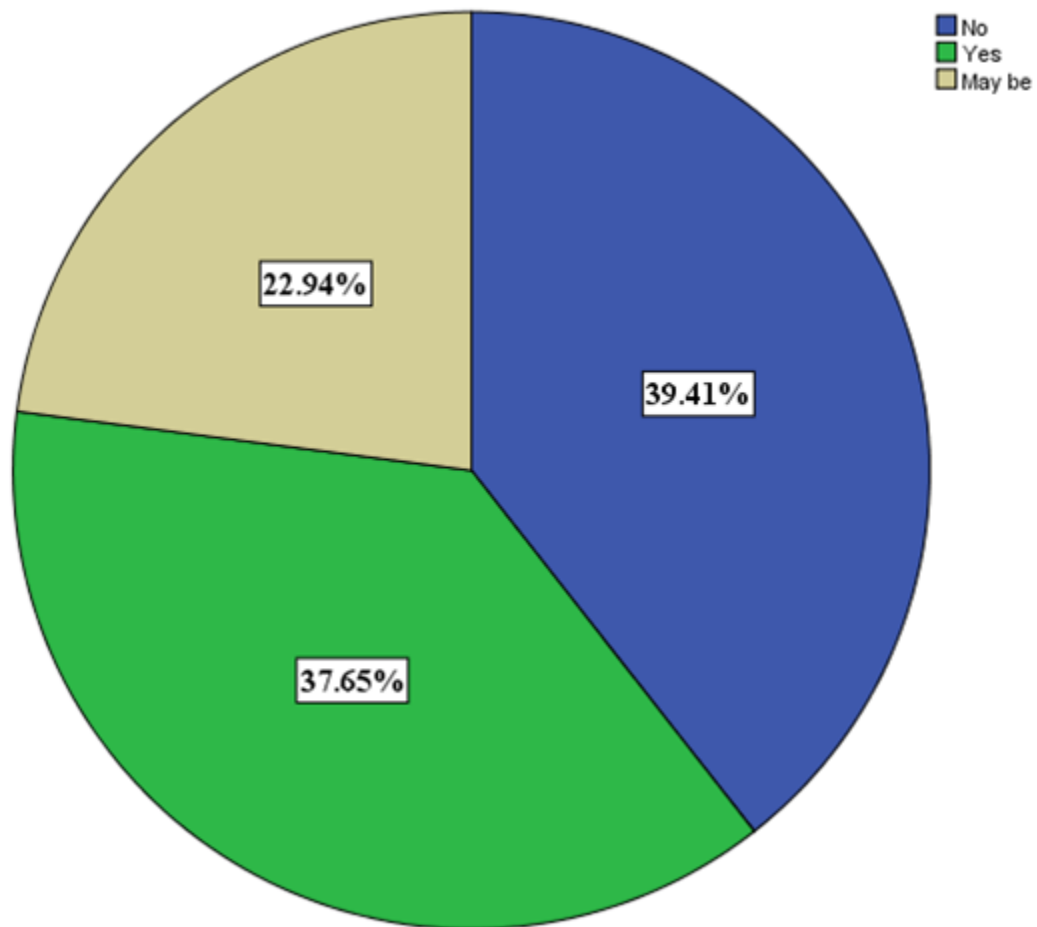


FIGURE 10: Shows the responses of providing information which is not needed. 39.41% (blue colour) responded that this tool didn't provide information which is not needed. 37.65% (green colour) responded that this tool provides information that is not needed. 22.94% (beige colour) responded that this may provide unnecessary videos. Majority of the population think that this tool didn't provide information which is not needed.

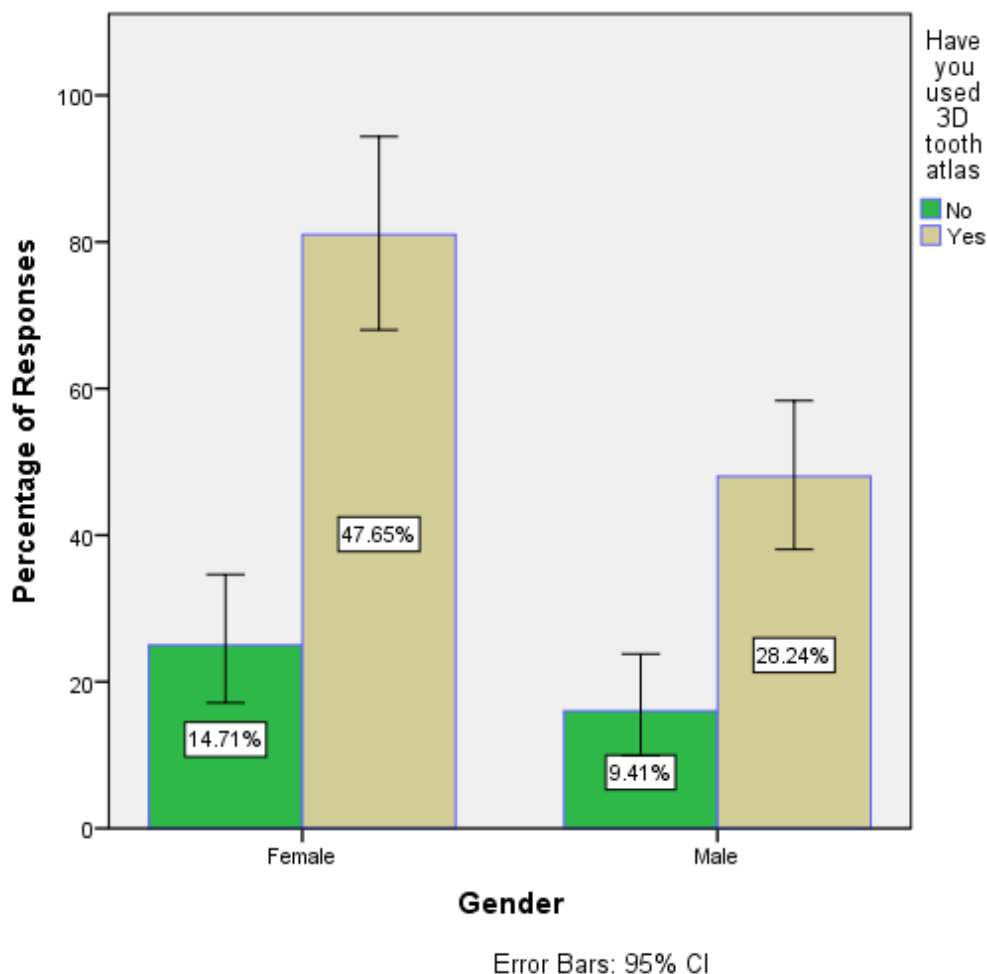


FIGURE 11: The bar graph represents the association between the gender and usage of 3D tooth atlas. X-axis represents gender and Y-axis represents percentage of responses for the amount of overall activity. Green colour (14.71% and 9.41%) denotes no and beige colour (47.65% and 28.24%) denotes yes. Pearson chi square test shows p value is 0.834, (p value > 0.05). Hence it is statistically not significant. Majority of the population said that they used 3D tooth atlas.

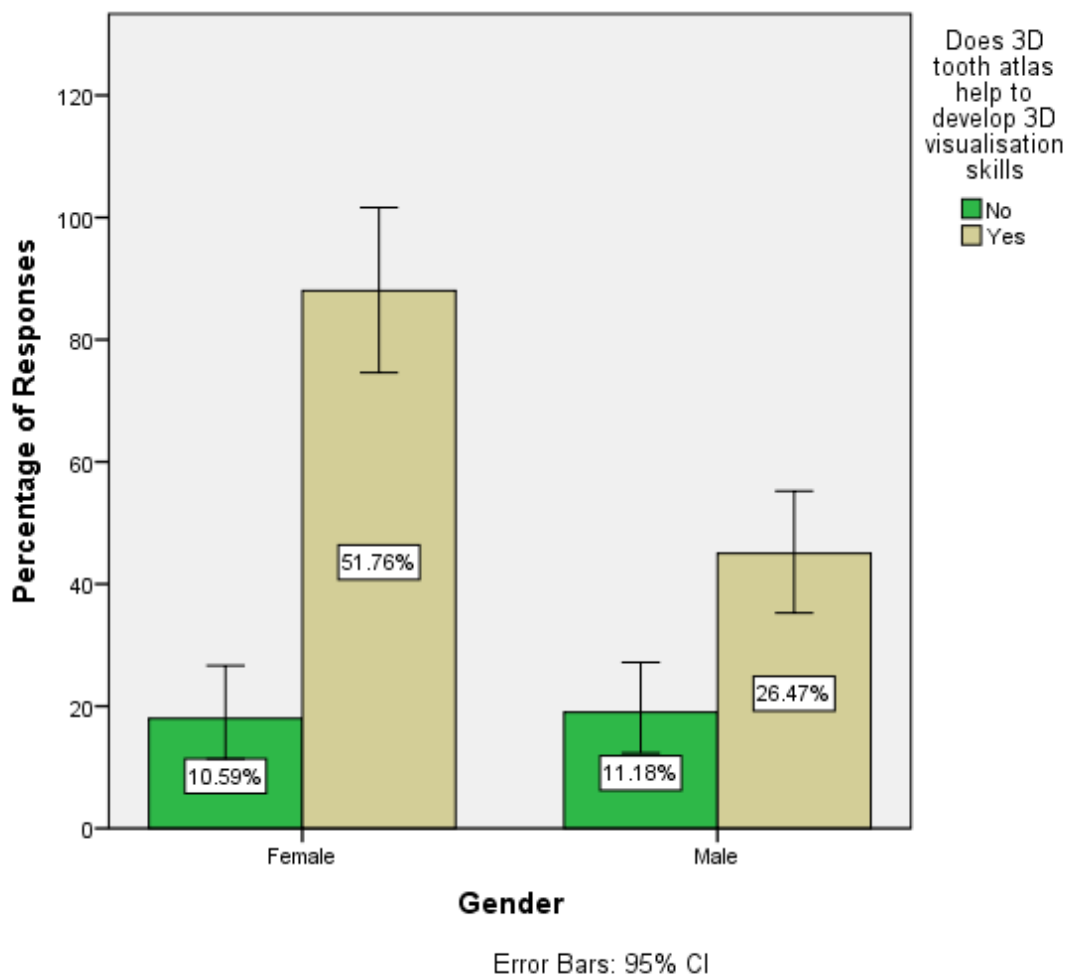


FIGURE 12: The bar graph represents the association between the gender and whether 3D tooth atlas helped to develop 3D visualisation skills. X-axis represents gender and Y-axis represents percentage of responses for the amount of overall activity. Green colour (10.59% and 11.18%) denotes no and Beige colour (51.76% and 26.47%) denotes yes. Pearson chi square test shows p value is 0.052, (p value > 0.05). Hence it is statistically not significant. Majority of the population think that a 3D tooth atlas helps to develop 3D visualisation skills.

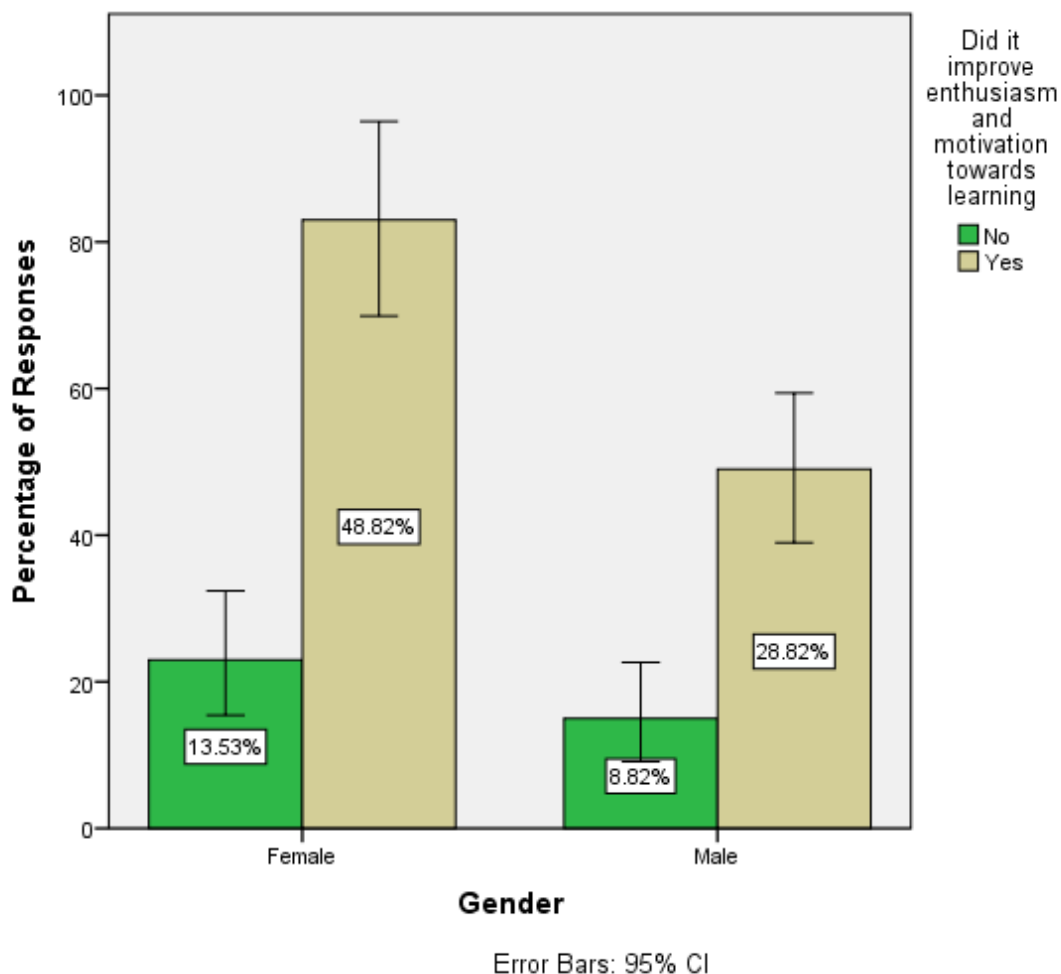


FIGURE 13: The bar graph represents the association between the gender and whether 3D tooth atlas improved enthusiasm and motivation towards learning. X-axis represents gender and Y-axis represents percentage of responses for the amount of overall activity. Green colour (13.53% and 8.82%) denotes no and Beige colour (48.82% and 28.82%) denotes yes. Pearson chi square test shows p value is 0.792, (p value > 0.05). Hence it is statistically not significant. Majority of the population said that this tool improves enthusiasm and motivation towards learning.

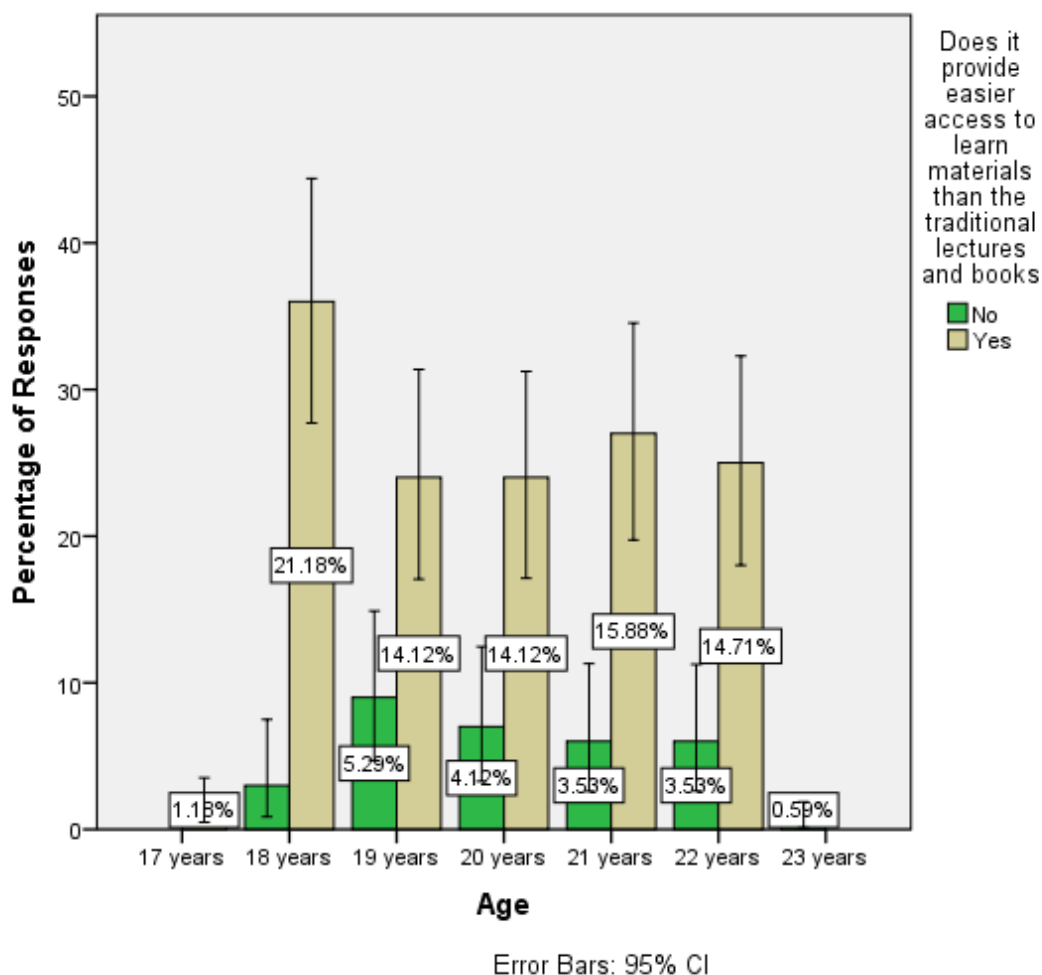


FIGURE 14: The bar graph represents the association between age and whether 3D tooth atlas has easier access to learning materials than the traditional lectures and books. X-axis represents age and Y-axis represents percentage of responses for the amount of overall activity. Green denotes no and beige colour denotes yes. Pearson chi square test shows p value is 0.134, (p value > 0.05). Hence it is statistically not significant. Majority of the population felt that this tool provide easier access to learning materials than the traditional lectures and books.

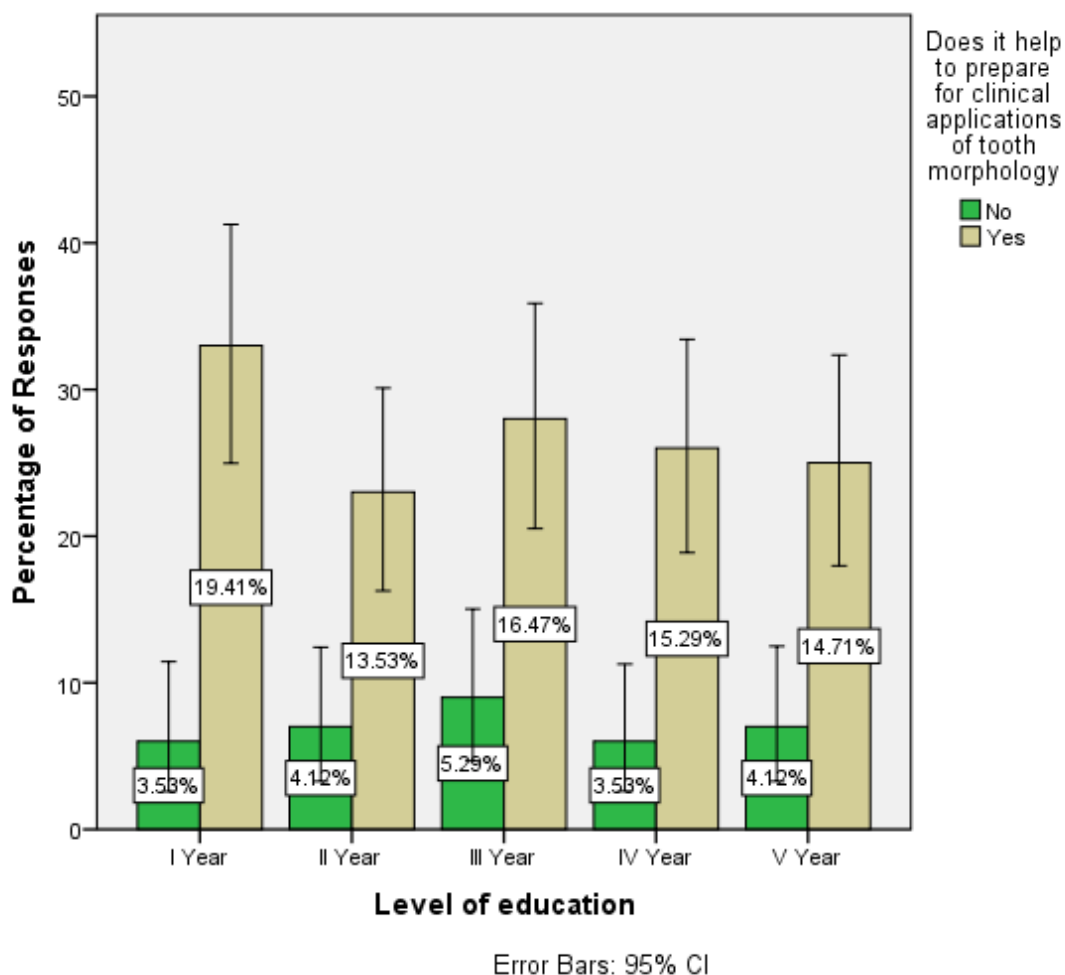


FIGURE 15: The bar graph represents the association between the level of education and whether 3D tooth atlas helped to prepare for clinical applications for tooth morphology. X-axis represents level of education and Y-axis represents percentage of responses for the amount of overall activity. Green denotes no and beige denotes yes. Pearson chi square test shows p value is 0.878, (p value > 0.05). Hence it is statistically not significant. Majority of the population felt that it helped to prepare for clinical applications of tooth morphology.

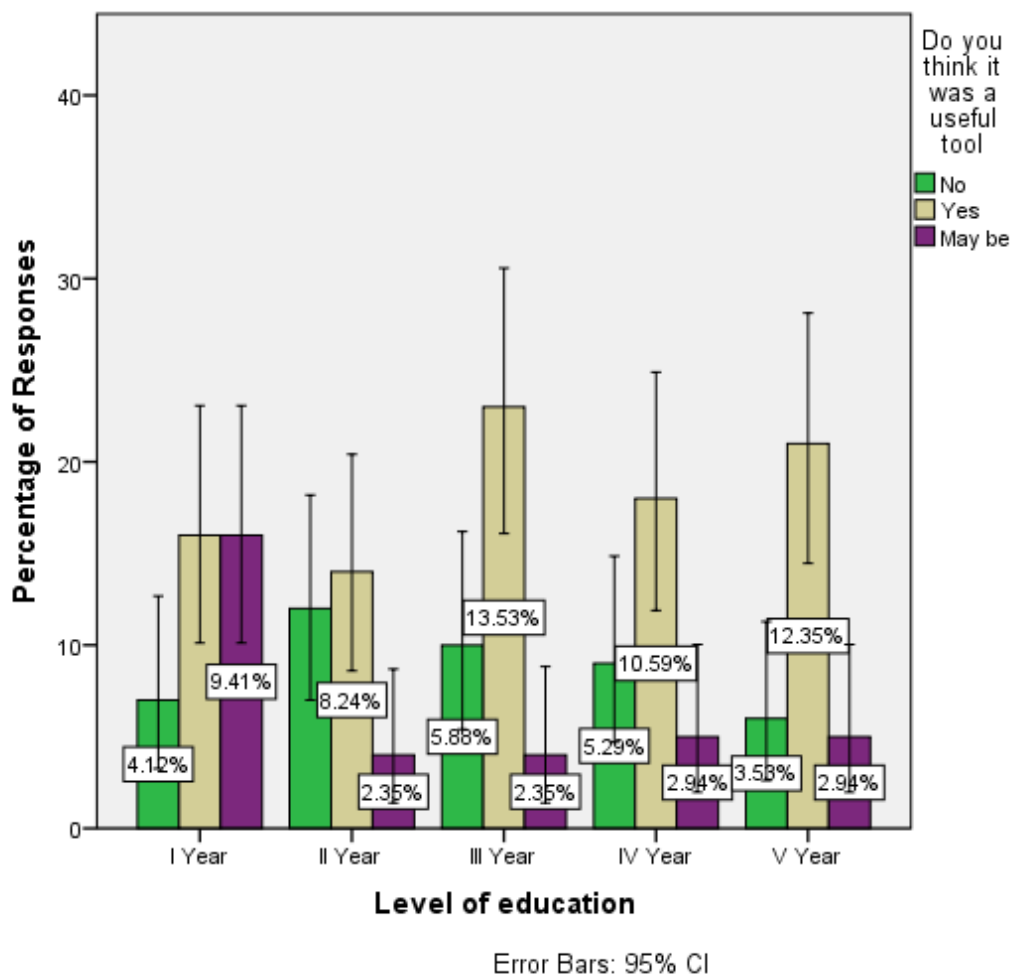


FIGURE 16: The bar graph represents the association between the level of education and whether 3D tooth atlas is a useful tool. X-axis represents level of education and Y-axis represents percentage of responses for the amount of overall activity. Green denotes no, beige denotes yes and purple denotes may be. Pearson chi square test shows p value is 0.020, (p value < 0.05). Hence it is statistically significant. Majority of the population felt this as a useful tool.

75.88% of participants have used 3D tooth atlas and 24.12% of participants haven't used 3D tooth atlas (Figure 1). 54.12% of participants said that this is a useful tool. 25.88% responded that this is not a useful tool. 20% responded that it may be useful (Figure 2). 77.65% responded that they participated actively in the class and 22.35% responded they didn't participate actively in the class (Figure 3). 27.06% responded that the tool can't be used outside the class, 47.06% responded that the tool can be used outside the class and 25.88% responded that it may be used outside the class (Figure 4). 78.24%

responded that the tool helped to develop 3D visualization skills and 21.76% responded that the tool didn't help to develop 3D visualization skills (Figure 5). . 81.18% responded that this tool provided easier access to learn whereas 18.82% responded that this tool didn't provide easier access to learn. (Figure 6). . 79.41% responded that this tool helped students to prepare for clinical applications of tooth morphology whereas 20.59% responded that this tool didn't help students to prepare for clinical applications of tooth morphology (Figure 7). 77.65% responded that this improved students' enthusiasm and motivation towards learning whereas 22.35% responded that this didn't improve students' enthusiasm and motivation towards learning (Figure 8). 1.18% responded bad, 10% responded average, 55.88% responded good and 32.94% responded excellent (Figure 9). 39.41% responded that this tool didn't provide information which is not needed. 37.65% responded that this tool provides information that is not needed. 22.94% responded that this may provide unnecessary videos (Figure 10). Blue colour (14.71% and 9.41%) denotes no and green colour (47.65% and 28.24%) denotes yes. Pearson chi square test shows p value is 0.834, (p value > 0.05). Hence it is statistically not significant (Figure 11). Blue colour (10.59% and 11.18%) denotes no and green colour (51.76% and 26.47%) denotes yes. Pearson chi square test shows p value is 0.052, (p value > 0.05). Hence it is statistically not significant (Figure 12). Blue colour (13.53% and 8.82%) denotes no and green colour (48.82% and 28.82%) denotes yes. Pearson chi square test shows p value is 0.792, (p value > 0.05). Hence it is statistically not significant (Figure 13). X-axis represents age and Y-axis represents percentage of responses for the amount of overall activity. Blue denotes no and green denotes yes. Pearson chi square test shows p value is 0.134, (p value > 0.05). Hence it is statistically not significant (Figure 14). X-axis represents level of education and Y-axis represents percentage of responses for the amount of overall activity. Blue denotes no and green denotes yes. Pearson chi square test shows p value is 0.878, (p value > 0.05). Hence it is statistically not significant (Figure 15). X-axis represents level of education and Y-axis represents percentage of responses for the amount of overall activity. Blue denotes no and green denotes yes. Pearson chi square test shows p value is 0.020, (p value < 0.05). Hence it is statistically significant (Figure 16).

DISCUSSION

3D tooth atlas is a software application designed primarily for education in dental anatomy. This tool contains 3D models of tooth, anatomy and morphology of dental structures. (29) (19). In this study we discuss the awareness of 3D interactive tooth atlas. This study contains responses of 170 people (106 females and 64 males). Other researchers on the similar topic by (4) (20) had 235 responses.

77.65 % of students felt 3D tooth atlas encouraged them to participate actively in the class but 22.35 % of students didn't feel like that. Research by (30) (31,32) reported that 61% of students felt that 3D tooth atlas encouraged them to participate actively in the class. Other researchers (12) reported that 39% were not participating actively in the class (23). The overall consensus is that the majority of students are being encouraged after using which made them participate actively in the class. 81.18% of students felt easy to learn compared to traditional lectures and books whereas 18.82% didn't feel comfortable using 3-D Atlas (24). Research from similar findings (33) (25) suggest that the atlas should be added to schools' vital books. 78.24 percent of students reported that it helped to develop 3D visualisation skills whereas 21.7% were opposed to that. There were no similar and opposing findings. According to the study 3D tooth atlas develops 3D visualisation skills (26,27,34).

The main limitations are time and sample size. Sample size is limited to specific groups such as dental students. The future scope of this research will be establishing 2-D and 3-D technologies in classrooms. Introducing these types of methods in class increases the enthusiasm and makes students participate actively during the class.

CONCLUSION

3D Interactive tooth atlas in classrooms other than books make students easy to learn and develop 3D visualisation skills. This tool was appreciated as a useful resource by the dental students. They had the strongest incentive to explore it as an aid to assess patients. The aim of the study was to create an awareness of 3D interactive tooth atlas among dental students and it is achieved. The interactive features and extensive inventory of images was too sophisticated for the learning needs of the students.

AUTHORS CONTRIBUTION

PREETHI RAJ M: Literature search, data collection analysis, manuscript drafting.

Dr. PALATI SINDUJA: Aided in conception of the topic, has participated in the study design, statistical analysis and has supervised the preparation and final corrections of the manuscript.

Dr. LAKSHMI : Data verification, manuscript drafting, preparation of the manuscript.

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CONFLICT OF INTEREST

Nil

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