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*Original Article*

# Evaluation of Time Dependent Performance of the 2nd Year Libyan Dental Students

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## ABSTRACT

**Objectives**: To evaluate and compare the academic performance of the second year dental students in the preclinical laboratory periods at three different session-times.

**Materials and Methods:** This study was carried out enrolling all second year dental students (n=267) at the Department of Conservative Dentistry and Endodontic, Faculty of Dentistry, University of Benghazi. The data were collected using the evaluation of students at preclinical laboratory sessions throughout the academic year, in addition to self-administered questionnaires to evaluate factors affecting performance of students. Each student was evaluated by performing a class I cavity preparation and amalgam restoration on a first mandibular left molar of a mounted (Typodont) tooth. The score obtained using a grade from 1-10 at three different session-times; early (8-10 am), mid-day (10-12 am), and late (12-2 pm) session. Data were statistically analyzed using One-way ANOVA and Tukey's post-hoc test using SPSS version 16.

**Results:** Statistical analysis showed a significant difference between student's scores attending mid-day and early sessions in class I cavity preparation, their means were $7.61 \pm 0.77$ and $7.25 \pm 0.77$ respectively (P=0.005). A significant difference was also observed between late and early sessions ($7.54 \pm 0.80$ and $7.25 \pm 0.77$) respectively (P=0.059). Regarding class I amalgam restoration, there was a significant difference between student's scores attending mid-day and early sessions, their means were $7.80 \pm 0.62$ and $7.53 \pm 0.59$ respectively (P=0.005).

**Conclusion:** Early session has the least score performance among the three time-sessions, whereas, a very similar score performance was obtained during the middle- and late time-sessions. Highly educated parents have a positive effect on student performance.

**Keywords:** Session-time, student performance, preclinical laboratory sessions, academic performance.

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## INTRODUCTION

Students are the main investment of colleges and universities. Student performance plays an important role in producing the best quality graduates who will turn to be human resources for the development of the countries in both social and economic divisions. Thus, students have to put great efforts in their study to obtain good grades and to prepare themselves for future opportunities to accomplish the employment demander or to start a carrier of their own as general practitioner [1].

Performance of dental students in preclinical stage provides a more sensible teaching environment. In addition, teaching facilities provided in the laboratories improved student performance. It has been reported that dental students would learn dental procedures and develop their hand skills better and faster when with new types of laboratory facilities than would do with the traditional bench-type laboratories [2]. Le Blanc et al stated that the human performance is influencing by various factors such as fear of failure, the load of academic and clinical work, unavailability of materials for study, pre-clinical training, and performance pressure [3]. Furthermore, studies have reported that dental students express considerable stress and anxious symptoms during their academic training more than the general population such as self-competence attitude, workload and performance pressure [4, 5]. Additionally, dental students who demonstrated high levels of stress in dental environment tended to show low academic

performance and low grades for pre-clinical capability [5]. This is because laboratory requirements required a significant amount of time and manual skills to manage [5]. In this context, female students experienced higher degree in emotional exhaustion than their male counterparts did [6]. Preclinical operative training in dental faculties involves the development of hand skills and improve various procedures, which will soon be performing on patients in the next clinical sessions. Usually, this process is time and manpower (workers) demanding, need wide-ranging materials, and specialized laboratory. The use of simulation clinics in dental schools were more sensible clinical teaching environment [2]. For instance computer virtual reality-based simulation systems became effective teaching methods in making the preclinical learning experience more efficient, lower costs, address faculty deficiency and could identify students who might need additional help and assistance in dental schools [7]. Other investigators found that the videos displayed in demonstration of preparation improved the undergraduate performance more than the conventional teaching methods did [1]. Usually, schools and faculties work hard to improve performance of their students.

Time and timing consider essential variables that connect the study of the brain and the learning capabilities, and hence can influence the academic performance of students [8]. Much of the circadian rhythm research suggests that student performance should increase throughout the school day [8]. According to Goldstein and Cardinali, the cognitive function of adolescents peaks in the afternoon not the morning and adults' cognitive function peaks in the late morning [8].

However, based on the timetable of the dental students teaching programme which is usually condensed, dental students tend to spend many hours during the day time at school, between lectures, laboratory and clinical sessions. It is likely that their learning ability expected to decrease due to physical and mental fatigues. Furthermore, the low energy and increased fatigability would probably increase throughout the day and result in lower levels of concentration and learning ability in the afternoon session [9]. This may influence the performance of the dental students. Therefore, this study aimed to evaluate the relationship between time of session and academic performance of the 2nd year Libyan dental students.

## MATERIALS AND METHODS

A cross–sectional descriptive study was conducted from October to April 2016 on the second year preclinical dental students at the Department of Conservative Dentistry and Endodontic, Faculty of dentistry, University of Benghazi. All study participants were provided with a brief description about the aims of this study. Students were asked to submit the completed questionnaire. A total of 267 questionnaires were distributed. Ethical permission was obtained from the dean of faculty of dentistry, University of Benghazi and verbal consent from all participants was taken. Students assured regarding the privacy of their data collected. The methodology composed of two parts for data collection: Part (1): Evaluation of students at preclinical laboratory sessions throughout the academic year and their data were collected in a form of mark from 1-10. Part (2): Self-administered questionnaires were distributed among students to investigate factors affecting performance of students. The questionnaire composed of five sections; Section A consists of questions about general information, Section B: personal characteristics, Section C: preparation of the topics before the lab secession, Section D: psychological related factors and section E: Teacher related aspect.

For the second year dental students, the operative laboratory work consists of three sessions per week. According to the faculty timetable the preclinical students were divided into eight groups; each group consists of approximately 33 to 38 students. Each student attended one operative laboratory session per week. Each student evaluated by performing a class I cavity preparation and amalgam restoration on a first mandibular left molar of a mounted (Typodont) tooth. The score obtained using a grade from 1-10 at three different session-times; early (8-10 am), mid-day (10-12 am), and late (12-2 pm) session. Statistical Package for Social Science (SPSS) version 16 was used for data analysis. Descriptive and statistics were applied as; one-way ANOVA and Tukey's post-hoc tests. $P \leq 0.05$.

## RESULTS

A distribution of dental students according to time sessions is illustrated in figure 1. It shows that the highest proportion (38.49%) of dental students attended early session, 35.85 attended mid-day session and 25.66 % attended late session (Figure 1).
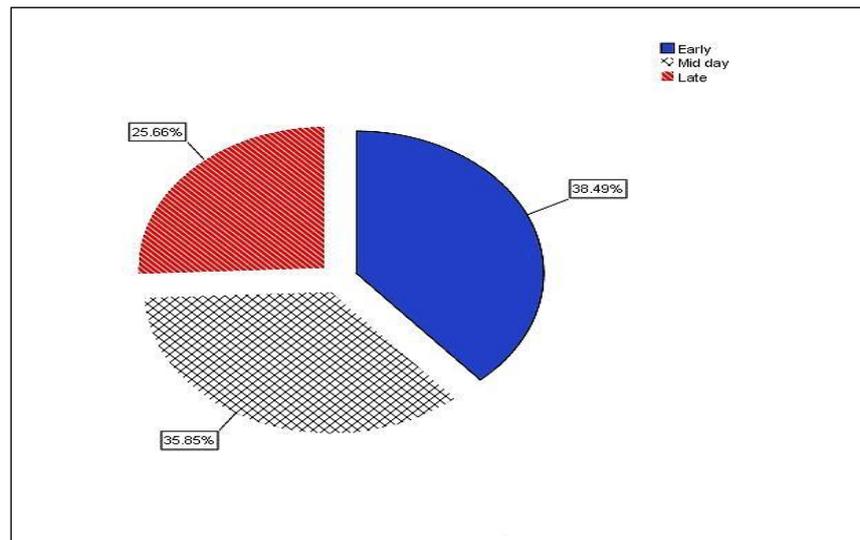
**Figure 1**: Distribution of dental students according to time of sessions.

Regarding the relationship between the time of the sessions & the scores of students in performing class I cavity preparation, statistical analysis (ANOVA test) showed that there was a high significant difference between the three groups; early, mid-day & late sessions (P= 0.005 & 0.007 respectively) (Table l). In addition, results showed that there was a high significant difference between scores of participants in class I who attended mid-day & early sessions, their means were 7.61 ± 0 .77 & 7.25 ± 0.77 respectively. P = 0.005. Significant difference was also observed between the scores of participants who attended late & early sessions (7.54 ± 0. 80 & 7.25 ± 0.77) respectively. P = 0.059. Regarding class I amalgam restoration, the results indicated that there was high significant difference between scores of participants who attended mid-day & early sessions and their means were 7.80 ± 0.62 & 7.53 ± 0.59 respectively. P = 0.005.

Regarding the scores of students in relation to gender, the results showed that there was a high significant difference between scores of males and female participants in class I cavity preparation, the mean values were 8.02 ± 0.74 & 7.4289 ± 0.73274 respectively. P value = 0.001 (Table 2). For amalgam restoration, results showed that there was highly significant difference between the scores of the males and the female participants where the means were 7.76 ± 0.70 & 7.62 ± 0.61 respectively. P value = 0.342 (Table 3).

Regarding the scores of students according to the age interval, the results showed that there was no significant difference among the age interval of participants in class I cavity preparation. their means were 7.51 ± 0 .65 & 7.46 ± 0.77 respectively. As

regards to class I amalgam restoration, there was no significant difference between scores of different age interval. Their means were 7.5 ± 0 .55 & 7.6 ± 0.61 respectively. Concerning the scores of student's as weather they taken breakfast or not, the results showed that 32.2% of the participant did not take breakfast in the morning while 67.8% said yes (Figure 2). The statistical analysis showed that there was no significant difference between scores of student taken breakfast or not for class 1 cavity preparations or for with a different time interval between the breakfast and the session. The results revealed that there was no significant difference between scores of class I cavity preparation with a different time interval between the breakfast and the laboratory session. The different time intervals of the students were; less than 30 min, 30-60 min, 60-90 min and 120 min or more. The means were 7.62 ± 0.62, 7.2000 ± 1.3, 7.4783 ± 79552, 7.529 ± 4.69584 and 7.5203 ± 0.73512 respectively, P value = 0.652.

The interesting in the results was that there was no significant difference between scores of class I cavity preparation and the scores of amalgam restoration for the students according to the mother educational level, but according to father educational level did show difference. According to place available for study, figure 3 shows that two-thirds of dental students (66.29%) of the students had a special place for study while 33.71% had no individual place for studying. A significant difference was observed for scores of class I cavity preparation for students who had a special place for studying, the mean values were 7.3898 ± 0.77, 7.6444 ± 0.7, respectively. P = 0.05 & 0.07.

Most of participants (87.27 %) had no health problem and 12.73 % had health problems (Figure 4). The scores

of students in relation to their health statues or taken medications or not; results showed that there was no significant difference between scores of students in relation to both conditions among all the groups. The scores of students in relation to weather the demonstrator are present or not during the session time showed that there was no significant difference in class 1 cavity preparations or scores of class I amalgam restoration. On the other hands, the results showed that there were no significant differences between the scores of cavity

preparation or amalgam restorations among students in relation to weather the teachers were frequently absent or not during their laboratory sessions.

Although the results of the study showed that 77% of the participants reported that their skills improved after watching educational videos, it was found that there was no significant difference between scores of the students in relation to weather they were watching educational videos or not for class I cavity preparation or amalgam restorations.

**Table 1:** Mean scores of class I & amalgam for class I during different times of the sessions.

|  | Time of session | Mean | Std. Deviation | 95% Confidence Interval for Mean | | P value |
|---|---|---|---|---|---|---|
|  |  |  |  | Lower Bound | Upper Bound |  |
| **Class I Cavity preparation** | Early | 7.250 | .8696 | 7.079 | 7.421 | **0.005\*\*** |
|  | Mid-day | 7.617 | .7740 | 7.458 | 7.776 |  |
|  | Late | 7.544 | .8045 | 7.349 | 7.739 |  |
|  | Total | 7.456 | .8336 | 7.355 | 7.557 |  |
| **Class I Amalgam** | Early | 7.535 | .5927 | 7.418 | 7.652 | **0.007\*\*** |
|  | Mid-day | 7.809 | .6269 | 7.680 | 7.937 |  |
|  | Late | 7.654 | .5875 | 7.512 | 7.797 |  |
|  | Total | 7.663 | .6131 | 7.589 | 7.738 |  |

$P \leq 0.05$

**Table 2:** Mean scores of class 1 according to gender of the second year dental students.

|  | Gender | Mean of scores | St. Deviation | P value |
|---|---|---|---|---|
| **Class I Cavity Preparation** | Male | 8.02 | 0.74 | 0.001 |
|  | Female | 7.42 | 0.73 |  |
| **Class I Amalgam** | Male | 7.76 | 0.70 | 0.342 |
|  | Female | 7.62 | 0.61 |  |

**Table 3:** Mean scores of class 1 and amalgams according to the gender.

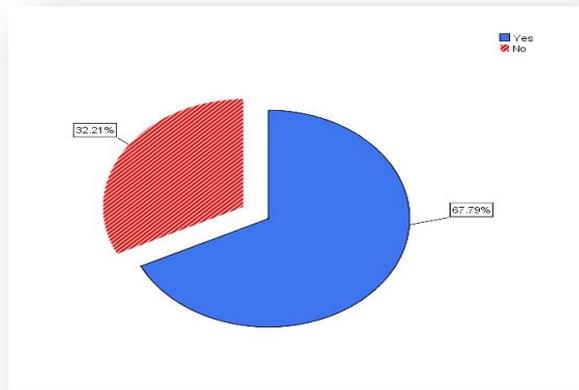| Gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| **F** | 246 | 7.4289 | .74507 | .04750 |
| **M** | 21 | 8.0238 | .73274 | .15990 |

**Figure 2:** Distribution of dental student's as weather they have breakfast or not.
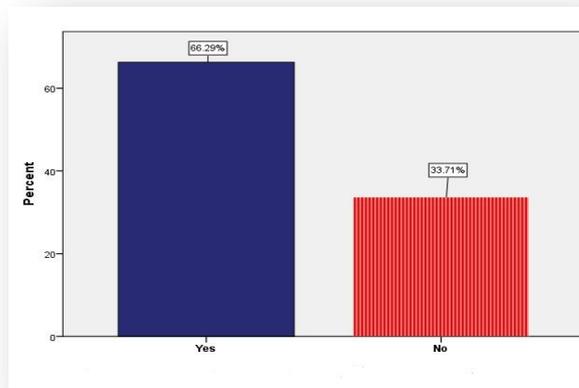


**Figure 3:**  Distribution of dental students according to their special place to study.
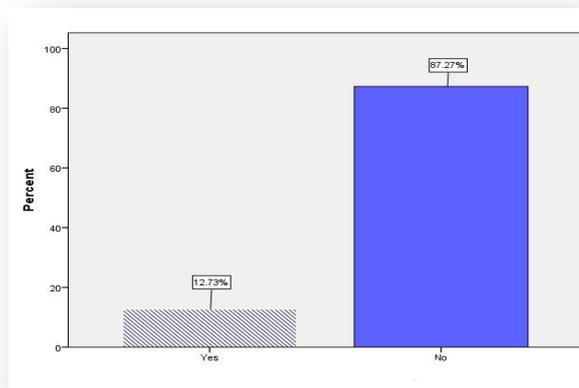


**Figure 4:** Distribution of dental students according to their health problems.

## DISCUSSION

This study was conducted to investigate the time dependent performance of the second year Libyan dental students at the Faculty of Dentistry, University of Benghazi, during their preclinical laboratory sessions to find out if there was any relationship between the student performance and the time of the teaching sessions and to explore various factors that affecting their performance. Determinants of performance of dental and medical students have been the subject of continuing argues among educators, academics, and their performance potentially influenced by many factors [10].

Various studies have been performed to examine this issue. It has been reported that the differences in students' grades were depended on hard work, discipline, previous schooling, parents' education, family income and self-motivation. and the student's attitude is the most important determinant of his/her learning [11, 12].

Results of the present study showed that performance of students at mid-day and late session were better than the early session. This finding was in agreement with Dills and Rey who concluded that later start times increase students' achievement because students were less sleep deprived [13]. Wolfson et al added that the number of hours of sleep was positively correlated with measures of academic achievement [14]. For this reason, some researchers recommended to start the school day an hour later to increase academic performance of the students. Edwards, Finley and Crowley et al documented that level of the adolescents' activity was higher in the afternoon than in the morning due to the secretion of melatonin which starts around 9:00 pm, peaks between 2:00 and 4:00 am, and stops around 7:30 am [15, 16].

Performance of male students in the current study was greater than female students. This finding was in line with Anderson and Benjaminwho found that the performances of male students were better than female counterpart, and this result could be related to the stress level of the student. Students who demonstrated high levels of stress tended to show lower grades for pre-clinical capability [17]. Alzahem et al explained that female students experienced higher degree in emotional exhaustion than male counterparts did in the preclinical years [6]. Moreover, this result was in consistent with the finding other authors who found a significant relationship between gender and student performances where female students performed lower than male counterparts [12, 18]. However, others found no consistent gender-related differences in students' performance [19-23].

Juan-José et al stated that the variation in the experiences and maturation of older students showed a relatively better performance in academic settings, which is known as the relative age effect (RAE) according to the policy of school organization for grouping students in the same academic year which is based on date of birth [24]. This effect is more significant in younger students and it is reduced in the older students. Their finding was inconsistent with the finding of this study because the difference in the age group was not large.

Other researchers pointed out that iron deficiencies and poor nutrition had negative effects on cognitive learning, and also this is associated with poor academic performance and attention span [25-27]. Their findings were not relevant with this study because the current study included no enough information about the type and the contents of the breakfast the student had before attending the session.

The results of this study showed that educational levels of fathers had great influence on student's educational attainment. Our results were in agreement with results of recent study done by Heineck and Anger who explained that better educated mothers and father worked more in paid employment, spent less time interacting with their children, and produce child with less education and low performance [28]. The private place for studying and reading at home had no influence on the scores of the students obtained in the current study. This result was inconsistent with the result of Chukwudi who indicated that student's home environment could either accelerate or hinder a student's academic performance [29]. Excellent teachers serve as role models, influence career and enable students to reach their potential. Nabi et al added that using of video and audio study teaching methods provided more opportunities for neutral development and learning [30]. The result of this study highlights the importance of the timetable schedule placed by the dental schools for the teaching sessions. Time factor can affects the academic performance of the dental students in the preclinical stage.

## CONCLUSIONS AND RECOMMENDATIONS

Within the limitations of the current study the following conclusions were drawn:

1. Early session had the least score performance among the three time-sessions.
2. hereas, a very similar score performance was obtained during the middle- and late time-sessions.
3. Father educational level affected the student performance more than mother educational level.
4. Rearrange the school schedules to take advantage of time of day to improve the student performance.

## REFERENCES

1. Robinson P.R. & Lee J.W. The use of real time video magnification for the pre-clinical teaching of crown preparations. BDJ 2001;1(9): 6-510.

2. James M.S., Lindquist TJ., Palik J.F. and Johnson l. A.: A Comparison of Student Performance in a Simulation Clinic and a Traditional Laboratory Environment: Three-Year Results. Journal of Dental Education. 2002; 66(12):1331-1337.

3. LeBlanc V.R., Urbankova A., Hadavi F. and Lichtenthal R.M.:A preliminary study in using virtual reality to train dental students. Journal of Dental Education March 2004;68(3);78- 383..

4. Ahmad F. and Bloushi N.: Stress Level and Contributing Factors among Dental and Medical Students: A Comparison between Old and New Curriculum. J Dent. Educ.2017; 81(5):534-544.

5. Sanders A.E. and Lushington K.: Effect of perceived stress on student performance in dental school. J. Dent Educ. 2014; 78(1):26-242..

6. Alzahem A.M., Van der Molen H.T., and De Boer B.J. Effect of year of study on stress levels in male undergraduate dental students. Adv. Med Educ. Pract. 2013; 18(4):217-22.

7. Eve E J, Koo S, Alshihri AA, Cormier J, Kozhenikov M, Donoff RB and Karimbux NY. performance of dental students versus prosthodontics residents on a 3 D immersive haptic simulator J Dent Educ. 2014; 78(1): 30-637.

8. Golombek DA, and Cardinali DP, Mind, Brain, Education, and Biological Timing. Journal Compilation © 2008 International Mind, Brain, and Education. Society and Blackwell Publishing, Inc. 2008; 2(1):1-6

9. Rosa, R., "Extended Work Shifts and Excessive Fatigue," Journal of Sleep Research 1995; 4 (1), 51–56.

10. Patel R. Eaton KA, Angela Garcia, Rinco V, Adams L, Brooks J: factors influencing dental practitioner performance. A Summary of a Recent Literature review. OHDM 2011; 10 (3):119-130..

11. Harb N and El-Shaarawi A. Factors Affecting Students' Performance. J Business Education, 2006; 82(5) -282-290..

12. Launius, M.H. College student attendance: Attitudes and academic performance. College Student Journal, 1997; 31(1), 86–92.

13. Dills, Angel K, and Rey Hernandez-Julian, "Course Scheduling and Academic Performance," Economics of Education Review 2008; 27(6): 646–654.

14. Wolfson Amy R. and Mary A. Carskadon. "Sleep Schedules and Daytime Functioning in Adolescents." Child Development, 1998;69(4): 875–87.

15. Edwards Finley. "Early to Rise? The Effect of Daily Start Times on Academic Performance," Economics of Education Review 2012; 31: 970–983.

16. Crowley Stephanie, Christine Acebo, and Mary Carskadon, "Sleep Circadian Rhythms, and Delayed Phase in Adolescents," Sleep Medicine 2007; 8: 602–612.

17. Anderson G, and D. Benjamin. The determinants of success in university introductory economics courses. J Economic Education 1994;25(2): 99-119.

18. Lipe M G. Further evidence on the performance of female versus male accounting students. Issues in Accounting Education, 1989;4(1): 144–152.

19. Bouillon M L and Doran B M. The relative performance of female and male students in accounting principles classes. J Education for Business, 1992; 67(4):224–228.

20. Durden G C and Ellis LV. The effects of attendance on student learning in principles of economics. American Economic Review, 1995; 85(2): 343–346.

21. Peiperl M. and Trevelyan R. Predictors of performance at business school and beyond: Demographic factors and the contrast between individual and group outcomes. J Management Development, 1997;16(5–6): 354–367.

22. Borde S F. Predictors of student academic performance in the introductory marketing course. J Education for Business 1998; 73(5): 302–306.

23. Didia D and Hasnat B. The determinants of performance in the university introductory finance course. Financial Practice and Education (1998); 8(1): 102–107.

24. Juan-José Navarro, Javier García-Rubio, Pedro R. Olivares. The Relative Age Effect and Its Influence on Academic Performance. 2015;10(10):447-452

25. Melanson K J. Back-to-school nutrition. American J Lifestyle Medicine. 2008;2:397-401.

26. Daniels D Y. Examining attendance academic performance and behavior in obese adolescents. The J School Nursing 2008; 24: 379-388.

27. Joe S, Joe E, and Rowley L L. Consequences of physical health and mental illness risks for academic achievement in grades K-12. Review of Research in Education, 2009;33(1):283-304.

28. Heineck G, Anger S. The Returns to Cognitive Abilities and Personality Traits in Germany. Forthcoming Labour Economics. 2010;17(3):335-546.

29. Chukwudi O C. Academic Performance of Secondary School Students-The Effect of Home Environment. Double Gist Publishers. Nig. 2013.

30. Nabi Bux Jumani, Yasmin Akhter, Saeed ul Hasan Chisthi and Muhammad Ajmal. Relationship between Training of Teachers and Effectiveness Teaching. International J Business and Social Science 2011; 2(4):2-11.