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Left – Handed Dental Students in a Right – Handed Teaching-Learning Environment

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Abstract*: Left – handedness is about 8 – 15% of the world population; it is more common among males than females. There are substantial studies on left-handed dentistry students as this profession requires manual skills or dexterity. However, there is no locally published study yet regarding how left – handed dental students learn in an environment where all the equipment and clinical instructors are for the right – handlers. This study aimed to determine how senior left-handed dental students learn how to execute different dental procedures like oral prophylaxis, cavity preparation and filling, and extraction. It also determined how left-handed dental students perceived themselves as clinicians; described the teaching-learning processes that senior left – handed dental students experienced; identified the different problems encountered in executing these dental procedures and explored the strategies teachers employed in teaching different procedures. This is a descriptive, qualitative research conducted among left – handed dental students in a private dental school in Metro Manila, Philippines. Actual observation of respondents performing at the out-patient department was done. Key informant interviews and focus group discussions with selected respondents were done. Participants were chosen thru purposive sampling. Data were analyzed according to Colaizzi's process for phenomenological study. The teaching-learning interactions and skills acquisition were described following the taxonomy of psychomotor domain of learning by Simpson. Findings showed that left – handed dental students were not bothered about their situation. They used various techniques to develop the competencies namely hand switching, finger resting, constant practice, demonstration, and utilization of media platforms. Difficulties and struggles included positioning in relation to patient, visualization of all lingual aspects of upper and lower teeth, carving of amalgam and having right – handed clinical instructors. In general, clinicians performed the selected clinical procedures at the adaptation level. The lack of awareness of the clinical instructors was a major hurdle for the left – handed students in their efforts to perform the different dental procedures. It is recommended that dental schools also provide the necessary instruments and equipment designed for left – handed dental students. This study can teach the left – handed dental students, teachers, administrators, dental education, researchers, traders, and manufacturers how else to improve dental education.*

Keywords— left-handed dental students, skills acquisition in dentistry, right-handed teaching-learning environment

1. INTRODUCTION

Left – handedness has been the subject of curiosity, stigma, and even discrimination in school settings for the past several years. It is relatively uncommon occurring about 8-15% of the population and higher incidence among males than females.

Several studies have shown that handedness or laterality impacts on selected professions especially those that require concentration, precision, and skills. Like in any other professions, dentistry equipment and instruments are manufactured to be used by right - handed users with fewer considerations to the left - handed people.

There are currently 26 dental schools in the Philippines. However, at present, majority of them have no available dental instrument and equipment for left – handers. Only 6 dental schools have dental units and chairs designed for left – handed students.

Like everybody else, left-handed people need to work in order to survive. But unlike their right-handed counterparts, left-handers have to live and work in a world where almost everything is made the other way around (Oscar, 2011).

2. LITERATURE REVIEW

Dentistry is a discipline that requires both mastery of knowledge and technical competence. Learning outcomes like technical and clinical competence belong to the psychomotor domain of learning and best learned with practice, with adequate and appropriate feedback and evaluation from the mentors (Lara, 2012). Competence can be regarded as a core value for safe and effective clinical intervention. It is demonstrable behaviour and can be measured by using criteria for performance standards. The concept of competence implies the capabilities to determine where it is appropriate to carry out a task as well as planning, clinical reasoning, contingency management, and performance of those with awareness of psychosocial context and ethical framework.

Bautista (2012) studied assessment of student competence in performing tooth extraction (exodontia). Graduating students are expected to perform this procedure at least at the mechanism level, where they perform tooth extraction uneventfully regardless of the patient type and age and where the procedure was performed. As the students continue to perform the procedure they should demonstrate mastery, confidence, and automaticity. Tooth extraction is a basic clinical procedure that must be mastered by the dentistry

students. Doing the procedure requires a collection of numerous micro skills that should be acquired and mastered over a period in an organized and sequential manner.

Meanwhile, the study made by Al-Johany in 2013 revealed that the prevalence of left-handed students in Saudi Arabia was around 7%. The study recommended that dental schools should provide for the left-handed students with needed equipment and a proper learning environment. Furthermore, expert senior left-handed dentists should help junior left-handed dental students to learn techniques and procedures used by left handers. Involvement of left-handed educators in the dental education could also be done (Al-Johany, 2013).

3. RESEARCH QUESTIONS

This study answered the research question: How do left-handed senior dental students learn the different dental procedures like oral prophylaxis, cavity preparation and filling, and extraction in a right-handed teaching-learning environment?

Specifically, it aimed to:

1. To determine how senior left-handed dental students perceive themselves as clinicians

2. To describe the teaching-learning processes that senior left – handed dental students experience in acquiring competence in different dental procedures specifically oral prophylaxis, cavity preparation and filling, and extraction in a right – handed environment

3. To identify the different problems that left-handers encounter in executing the different dental procedures

4. To explore the strategies dentistry teachers employ in teaching the participants to execute the different dental procedures in a right-handed environment.

4. SCOPE AND LIMITATION

This study was conducted in a private dental school in Metro Manila, Philippines. The main objective of the study to determine how senior left-handed dental students learn how to execute different dental procedures like oral prophylaxis, cavity preparation and filling, and extraction.

This study was limited to the actual observation of respondents performing at the out-patient department. Participants in this study were the left – handed senior dental clinicians enrolled in Clinic 3 and 4 during the first and second semesters of school year 2016-2017 respectively. All are female, single, and Filipino citizens.

Key informant interviews and focus group discussions with selected respondents were done. Participants were chosen thru purposive sampling. Data were analyzed according to Colaizzi's process for phenomenological study. The teaching-learning interactions and skills acquisition were described following the taxonomy of psychomotor domain of learning by Simpson.

5. RESEARCH METHODOLODY

This study is a descriptive - qualitative research conducted among all left – handed senior dental students in a private College of Dentistry in Metro Manila, Philippines. It is the appropriate design when the researchers want to know about events, who were involved, what was involved and where did things take place (Lambert, 2012). A combination of key informant interviews with these students and actual observations of their clinical rotations were conducted to describe their experiences while trying to acquire selected basic clinical competencies in dentistry.

Site of the study

A private Dental School which was originally situated in Manila since the year 1929 served as the site where this study was conducted. In 1996, the campus was transferred to the North part of Metro Manila due to the damage of the building brought about by an earthquake in 1991. There are 430 students enrolled at present and they are a mixture of different races like Iranians, Indians, Turkish, Nigerians, Nepalese, and Filipinos. The medium of instruction is English. This year is the 87th founding anniversary of the college and is continuously producing distinct graduates committed to serve the nation and the global community.

Population and Sampling

Participants were chosen thru purposive sampling method which is consistent with this kind of descriptive – qualitative research design. There are currently ten (10) left – handed senior dental students enrolled in the sixth year level.

Consent was secured from the participants stating the nature and purpose of the study, procedure and methods to be used, willingness to join, and options for withdrawal from the study. Unfortunately, only 5 left-handers participated and completed the study because the other half was currently taking their back subjects and were not enrolled in Clinic 3 and 4 during the first and second semester respectively.

Data Collection Procedures

Focus group discussions and key informant interviews

Participants were gathered by the research assistant for a series of focus group discussions (FGDs). The first meeting served as an orientation on the study and the research assistant explained the how, when, where, and how long the study would be conducted as well as the purpose. After giving all those information and all the participants consented, the study was commenced. Succeeding FGDs were conducted to compliment and clarify observations notes made by the research assistant.

In-depth interviews were also conducted using semi – structured guide questions. The interviews were audio – recorded with the consent of the participants for the purpose

of preserving data for transcription and analysis. The participants were asked to answer the following questions and they were all encouraged to talk freely and tell their stories.

o How do you see yourself as a left – handed senior dental clinician compared to your right – handed counterparts?

o What problems have you encountered in the acquisition of your skills on how to perform the different dental procedures like oral prophylaxis, cavity preparation and filling, and tooth extraction in relation to:

a. Positioning

b. Instrumentation

c. Manual Maneuver

o How did you adapt yourself to perform the different dental procedures like oral prophylaxis, cavity preparation and filling, and tooth extraction being a senior left-handed dental student in a right – handed teaching-learning environment?

o How were you able to learn the different dental procedures like oral prophylaxis, cavity preparation and filling, and tooth extraction having the majority of dental educators are right – handed as well as the instruments and equipment are also designed for right handlers.

Clinical instructors handling these students were also interviewed to answer selected questions to validate the answers of the students. This aimed to triangulate the data gathered from students. The faculty members were asked the following questions:

o How do you deal with senior left – handed dental students during their teaching-learning encounters in the clinic?

o What are the difficulties that you have encountered in teaching the senior left – handed students given that you are right – handed/left – handed?

Direct Observation

Aside from the interviews and FGDs, the research assistant also observed and video recorded the student-patient interaction and their clinical instructors in the course of performing the three dental procedures. The principal investigator was also present as an observer but stayed in the clinic's most inconspicuous place. The video recording was done by the research assistant to avoid any discomforts among patient, participant and principal investigator considering that the latter was one of the faculty members in the dental school. Consent was secured from the patient/participant/ clinical instructors prior to video recording of the different dental procedures.

Instrumentation

Two letters of request were sent to the Dean of the College of Dentistry and the Research Director of the university. The letter explicitly informed them of the nature and purpose of the research, questions to be asked and the data collection procedures to be followed. After the approval of the requests, in – depth interviews of the participants in a private room in the college were scheduled according to their individual availability. The interviews were conducted in English and lasted for about 30 to 45 minutes each. Privacy was maintained during the entire procedure including their identities, thus codenames were assigned. Included in the letter was the permission to allow the video recording of each participant and patient while the former was performing the different dental procedures.

Ethical Considerations

The involvement of all the participants in this study was purely on a voluntary basis. Respondents were informed about the purpose of the study, the benefit of their participation, the procedure and methods to be applied (length of interview and the use of voice recorder) and the right to withdraw from the study, or to have a special request during the interview that some information will be edited from the recording. The possible risks and discomforts of participating to this study were also explained to the participants. Anonymity and confidentiality of the information obtained from the participants were strictly followed. Codes were used instead of the real names of the participants during the voice recording and in the discussion of the result.

Data Analysis

Data were analyzed according to the transcribed audio–recordings of each participant. The researcher read descriptions of each participant then extracted statements with significance to the research question. This was followed by the articulation of the statements so that the researcher was able to categorize and form similar themes. Finally, the results were integrated into a comprehensive description of the topic. The researcher returned to each participant to verify the results. This entire process of qualitative data analysis followed Colaizzi (1978).

The following steps represented Colaizzi process for phenomenological data analysis (cited in Sanders, 2003; Speziale& Carpenter, 2007).

1. Each transcript should be read and re-read in order to obtain a general sense about the whole content.

2. For each transcript, significant statements that pertain to the phenomenon under study should be extracted. These statements must be recorded on a separate sheet noting their pages and line numbers.

3. Meaning should be formulated from these significant statements.

4. The formulated meaning should be sorted into categories, clusters of themes, and themes.

5. The findings of the study should be integrated into an exhaustive description of the phenomenon under study.

6. The fundamental structure of the phenomenon should be described.

7. Finally, validation of the findings should be sought from the research participants to compare the researcher's descriptive results with their respective experiences (Sosha, 2012)

A separate analysis was done on the video recorded observations of the different dental procedures. The teaching-learning interactions between clinical instructors and participants were described based on the psychomotor domain of learning levels by Simpson.

How senior left-handed dental students perceived themselves as clinicians

Participants stated that at first, they did not mind being a left hander. They were also not aware that taking up Dentistry as a course and being a left hander would have an impact when it comes to manual dexterity compared to their right handed counterparts. However, when they started to have exercises that required hand manipulation, participants started to develop self – pity and inferiority complex in relation to their right-handed classmates. The difficulty and struggle experienced by the participants whenever they encounter different activities to perform the different dental procedures led them to develop low self – esteem.

Clinician 2 confided that "Personally, I think that being left – handed is difficult, especially in the practical aspects of Dentistry. I need to follow and understand the procedures taught by right –handed professors. I think right – handed persons/students are better than me in coping and understanding the procedures. And because of that I have low level of self – confidence." This result was in agreement with the findings of Henderson (1996) who found that left – handed dentists thought that left – handedness was a general inconvenience. And in contrast to the study done by Al-Johany (2013) who stated that more than half of their participants reported that being a left – handed is not a problem in general.

On the other hand, all respondents admitted that despite the difficulty of being in a right-handed teaching-learning environment, they needed to keep up with the standards required in the course. They needed to be able to perform the various dental procedures competently as the same standards would be used to assess the quality of their performance. Clinician 5 said "At first, I found it hard to work in the clinic but as time went by I got used to it. It's fine with me being a left – handed clinician since I can do all the requirements as much as the right – handed clinicians." Clinician 1 even said that "at first, it was hard but after some time I got used to it. I (even) feel like I'm kind of above them (right – handed) and special being a lefty but I can finish and do my task in the clinic fast and clean."

Skills acquisition of left-handed dental clinicians

All participants have their own unique way of adapting themselves in performing the different dental procedures. Respondents shared that they used a variety of strategies like modification of position, seeking advice with their co – left handed classmates and clinical instructors, using their right hand to support the left finger, simultaneous use of both hands, depending on what specific dental procedures they would perform. According to the participants, their adaptation in working with the right – handed environment was full of challenges and difficulties.

Respondents shared that their skills acquisition started during their theoretical pre – clinical period in the classroom where they learned the basic concepts and principles about the different dental procedures. Continuous exposure and usage of right – handed instruments and dental chair made them to gradually adapt to perform the different dental procedures with less inconvenience and it was practiced and demonstrated during their laboratory sessions.

During actual execution of skills, respondents shared the difficulties concerning how they positioned themselves in relation to their patients since dental units and chairs were designed for the right – handed dental students. Clinician 2 stated early on that one of her major problems was related to the clinical instructors who were all right – handed who taught all the procedures mentioned. Clinician 2 said that she needed more time to be able to understand, absorb and process all the information to perform a certain dental procedure. Majority of the right – handed clinical instructors were not aware that the left – handed dental students were facing difficulties and struggles in acquiring the different dental procedures. They regarded left – handed students as a regular right – handed individual who could easily follow and understand how to perform the different dental procedures as instructed. No special attention and effort was extended to the left – handed dental students for them to give more time to process and understand how to perform the different dental procedures with less difficulty and inconvenience. They did not even teach special techniques or modification in the manipulation of hand and proper positioning where they could perform all the procedures efficiently. Up to the present time, participants stated that there were not available books and information that guided them how to cope up with being left – handed dental students. Same results were found in the study of (Al-Johany, 2013) wherein around two – thirds of the respondents encountered problems when working with their right – handed instructors. When it comes to positioning, almost all of the participants are accustomed already to stay at the right side of the patient in doing almost all of the dental procedures except when they were performing extraction of the teeth; they positioned themselves at the back of the patient. However, Clinician 4 admitted that she had difficulty in visualizing the lingual and

buccal sides of the upper dentition of the patients. This result is similar to the findings of the study made by (Adusumilli, et al, 2004) wherein operations on the right side of the patients were difficult for the left – handed surgeons. The study by (Orbach, 2004) reveals that the overall average performance of left – handed practitioners could be improved by providing the opportunity to work from the left side of the patient as compared when they stay doing the procedures at the right side of the patient.

According to the participants, they did not have any problem in instrumentation though all of the instruments were designed for right – handed individuals; they were all accustomed to them. They learned how to use all the instruments during the time when they started to use it during their theoretical pre – clinical subjects. Constant practice and application of the knowledge acquired from their right – handed clinical instructors and thru reading of books, they overcame their difficulties. During the conversation with the participants, all of them hoped that someday the manufacturers of the dental instruments would produce instruments designed for left – handed dentistry to avoid inconvenience. Relative to the study (Dobson, 2005), it was suggested that having the basic sets of left – handed instruments like scissors, clamps and needle holders available in the teaching hospitals for medical students and surgical residents may minimize the inconvenience associated with learning.

Regarding the manual maneuver of the participants, switching hand preference is innate to them. This phenomenon could be explained as one of the strategies for easy accessibility to the hand instruments situated on the bracket table of the dental chair. It is also an advantage on their part being ambidextrous in the performance of tooth extraction in particular. It is the common strategy to manage the physical challenges by the left – handed clinicians wherein, they utilize both of their hands for the performance of the different dental procedures like oral prophylaxis, cavity preparation and filling, and tooth extraction. The difficulty in carving the filling was expressed by Clinician 2 and Clinician 4 as well as visualization of all the lingual aspects of both the upper and lower teeth.

Comments and Suggestions from the left – handed dental students included:

- "The clinical instructors should spend more time to teach or to instruct how to perform the different dental procedures to the left – handed dental clinicians for the reasons that they need more time to process all the information that will be given to them."

- "It will be a great help for the left – handed dental clinicians to have a left – handed instructor per department of the dental clinics."

- "Left – handed dental student should be taught how to use the instruments and dental units intended for them during their pre – clinical subjects."

- "Proper positioning for being a left – handed should also be observed and implemented."

- "Purchase dental instruments and dental units exclusively for left – handed clinicians and students."

Strategies employed by the clinical instructors in teaching the clinicians in executing the different dental procedures in a right – handed environment

Majority of the clinical instructors were not aware that the left – handed clinicians were having difficulties or facing struggles as they spent time in the clinics. No special attention, time and effort were given in teaching the left – handed dental students. Except for Clinical Instructors 7 and 8 who were also left – handed, they exerted lots of effort and patience in dealing with their fellow left – handed dental students. They related the teaching strategies they found effective. They even demonstrated how they performed the different dental procedures while the left – handed student watched. After which, the student was asked to perform the same procedure as demonstrated by their clinical instructor.

The teachers also said that it was crucial that they should be knowledgeable on the type of learner they were dealing with so that they could approach the learners appropriately. Clinical instructors played an important role in creating an environment supportive to the learning process of the left – handed students. They should make things easier for the left – handed dental students to acquire skills in the performance of the different common dental procedures.

The lack of awareness of the clinical instructors appeared to be a major hurdle for the left – handed dental students in their efforts to perform the different dental procedures like oral prophylaxis, extraction of the tooth, and cavity preparation and filling. And because of that, they observed and perceived that majority of the left – handed dental students were stubborn without investigating the root cause. The innocence of the clinical instructors on what kind of learners they have, made the learning environment unfavourable for the left – handed students. Clinical instructors remarked they needed more practice, the administrator should purchase left – handed unit and chairs as well as hand instruments, should hire left – handed clinical instructors.

Development of clinical competencies according to the psychomotor domain of learning

In every procedure that the left – handed dental students were tasked to perform, they always asked their right – handed clinical instructors to check the oral clinical status of the patients. This is followed by prophylaxis. Actual observations captured in the video showed the different difficulties that the left – handed dental students experienced. The awkwardness of their position, accessibility of the instruments and the visibility of the operative site were observed and perceived as their difficulties. This situation corresponded to set which is the second level of Simpson

psychomotor domain of learning. Though they reached Clinic 3 and have done several cases of dental procedures, they were hoping that through constant practice by joining dental missions, they would be able to overcome such difficulties. The clinical instructors on the other hand, encouraged all clinicians during their free time to participate to the said activities regardless of handedness to enhance their dental skills. During the performance of the different dental procedures, it was observed that the patients were also a bit uncomfortable when they were managed by the left – handed dental clinicians. Some of the clinicians retracted the cheek of the patient extensively lateral-ward for them to visualize the operative site clearly. Regarding the clinicians, most of them were not working ergonomically having done the procedures with forceful bending of their body and neck while sitting or even in standing position. In the application of psychomotor domain to the different dental procedures performed by the left – handed dental students, all of them started at the first level of Simpson psychomotor domain of learning which is perception during their pre-clinical theoretical phase of their study at second year to fourth year level. It was during those years that they were exposed to the different instrument and equipment commonly used in the practice of Dentistry and majority was for right – hander. In every laboratory period, they did not have any other choice but to continue on using what was available during that time. Continuous usage and exposure made them forcefully adapt to the instruments and equipment designed for right – handed students. The coping mechanism was initiated by the left – handed dental clinicians and not from their clinical instructors.

Clinicians reached the guided response stage when they reached the fifth and sixth year level, it was the time when all of them were enrolled and finished Clinic 1 and 2. Learners performed the different dental procedures with close supervision of the clinical instructor based on the step by step methods of dental procedures like oral prophylaxis, cavity preparation and tooth extraction. After doing the assigned procedure, the clinical instructor immediately gave feedback about the performance and corrected all the mistakes done by the left – handed students.

As narrated by the participants, they learned how to perform the oral prophylaxis when it was first demonstrated to them by their right – handed teacher done on the actual patients. The procedure was explained in a step by step manner however, the hand maneuver was executed in a right – handed manner. After their observation, they started to think and process all the information and converted it on how they can execute the procedure using their left – hand. During their first encounter with the patient, they felt nervous and spent more time than do right – handed counterparts, removing the stains and tartar of their patients. They also felt awkward in handling and manipulating the instruments inside the mouth of their patients. After doing two to three procedures under the close supervision of their instructors inside the pre – clinical laboratory, and after completing the thirty required number of oral prophylaxis, they already reported to have achieved confidence in doing the procedure.

Over time, clinicians demonstrated systematically the expected movements during the performance of the different tasks and with lesser supervision from their clinical instructor. They seldom called the attention of the clinical instructor compared before unless they were very sure that their job was done correctly. At this stage, the participants already reached the mechanism level. And through constant practice, completion of desired number of requirements per department, clinicians reached the complex covert response stage.

With regard learning the procedure of cavity preparation, the left-handlers started first using a dental cast made of dental stone. The preparation was made with the use of hand instruments and it was done during their pre – clinical laboratory period. It was followed by laboratory exercises of the same procedure but this time the cavity preparation was made on the typodont, a simulation of real tooth morphology. After they acquired the skills and applied the basic concepts and principles of the said procedures, the teacher explained and demonstrated the step by step procedure before they were allowed to execute it in actual/real patients and under close supervision. When they reached clinics, they were required to perform about twenty exercises of tooth preparation in the Restorative Section until they developed mechanism and automaticity.

Furthermore, in the case of exodontia, the left – handed dental students said they had a hard time positioning themselves in relation to their patient. They labored hard in hand manipulation, using their left – hand, without being forceful. They felt that every time they would perform this, a fracture might happen, and this made them feel less confident. They confided they still needed more supervision and guidance preferably from their fellow left – handed clinical instructors. They needed more active participation in the dental missions held in the adapted community of the college so that they were able to practice their skills in the performance of doing extraction of the teeth and at the same time completing 30 cases required by the Department of Surgery. The series of events happened during the pre – clinical period stage reflecting perception and set. Problems encountered during that stage of learning experiences by the left – handers included hand manipulation and visualization of the operative site especially the posterior upper teeth and the lingual aspect of upper dentition. They did not totally overcome those difficulties until they became clinicians and reached Clinic 4.

In the final analysis, majority of the participants were able to perform the selected dental procedures at the adaptation level. They were able to modify things to fit their needs; they performed the different dental procedures mindful of following the basic principles behind them. In the skills acquisition of the different dental procedures, the senior left -

handed students honed their skills at the Outpatient Department of the College of Dentistry.

6. RESULTS AND DISCUSSION

The left – handed dental students were not bothered about their situation. And in the beginning, they were not aware that being a left – handed has an impact in dental practice. These students developed various techniques of acquiring the competencies despite being in the midst of a right-handed environment. These included hand switching, finger resting, constant practice, demonstration, and utilization of media platforms.

The difficulties and struggles hurdled by the participants in the execution of the different dental procedures were the following: positioning in relation to patient, visualization of all lingual aspects of upper and lower teeth, carving of amalgam and having right – handed clinical instructors.

Regarding the contribution of the teachers in employing the strategies how to deal with the left – handed dental students, the lack of awareness of the clinical instructors appeared to be a major hurdle for the left – handed students in their efforts to perform the different dental procedures like oral prophylaxis, extraction of the tooth, and cavity preparation and filling.

Clinicians were able to perform the four selected procedures at the adaptation level. They reported having gained the readiness to perform them during their pre-clinical years. Handling actual patients during their OPD rotation became the final application experience and they were able to reach the standard level due to the close supervision of their clinical supervisors.

Results generated from this study could give way for better understanding and improvement of the dental education specifically for the left – handed students.

Based on the findings, the study recommends the following;

- Dental school should provide at least a few units of the necessary instruments and equipment designed for left – handed dental students.
- The school of dentistry should hire faculty members who are left – handed both in pre – clinical and clinical subjects.
- In admission for Dentistry, hand preference should be determined for proper orientation.
- Encourage the Dentistry Council to create a club/organization exclusively for left – handed dental students.
- The university library should provide research/reading materials about left – handed Dentistry.
- Make a research on the correlation of left – handedness in the accomplishment of clinical requirements.
- The right – handed faculty should also spend time teaching and attending to the needs of the left – handed dental students.

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