

# Beyond words: facets of non-verbal communication used in undergraduate medical and dental education classroom

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## ABSTRACT

**Objective:** To measure and evaluate the different facets of non-verbal communication among educators in undergraduate medical and dental classrooms.

**Methods:** This cross-sectional analytical study was conducted from April 2022-February 2023 at Shifa College of Dentistry and Shifa College of Medicine, Islamabad-Pakistan. A stratified random sample of 242 students from Bachelor of Dental Surgery (BDS) and Bachelor of Medicine, Bachelor of Surgery (MBBS) programs was targeted, with 229 respondents (response rate 94.6%). Data were collected using a structured, pre-validated questionnaire comprising five subscales-proxemics, kinesics, oculosics, chronemics, and vocalics-rated on a 5-point Likert scale. Data were analyzed using SPSS (v26.0).


**Results:** Of 229 students, 150 (34.5%) were MBBS and 79 (35.5%) were BDS students; 149 (65%) were male and 80 (35%) were female students. Chronemics received the highest rating (median=4.67), followed by vocalics (median=4.33), while proxemics and oculosics were rated lower (median=4.00). Younger students, female students and MBBS participants showed a greater preference for kinesics. Gender comparisons indicated that female students rated both kinesics and oculosics higher than their male counterparts, albeit with small effect sizes, and significant variation in kinesics was noted among different academic years ( $p=0.049$ ).

**Conclusion:** This study demonstrated the significant impact of non-verbal communication in medical and dental education classrooms. Chronemics, vocalics and kinesics emerged as the preferred facet. Younger students, female students and MBBS students showed a greater preference for kinesics. These findings emphasize the need for educators to tailor their non-verbal communication to meet the diverse needs of students in dynamic learning environments.

**Keywords:** Communication (MeSH); Nonverbal Communication (MeSH); Cues (MeSH); Education, Medical (MeSH); Education, Medical, Graduate (MeSH); Students, Medical (MeSH); Students, Dental (MeSH).

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education,<sup>7</sup> despite its crucial role in human interaction. This has led to a significant gap in how people convey and interpret messages beyond spoken words. "Non-verbal communication pinpoints the messages other than words that people exchange".<sup>5</sup> The teachers' non-verbal behavior affects students' way of learning and internal motivation.<sup>2</sup> Positive cues help students in their learning process. Teachers should be competent in interpreting students' non-verbal hints.<sup>2,8</sup> Non-verbal communication can be both intended and unintended but mostly occurs unconsciously, and the teacher is not aware that along with verbal communication, their non-verbal message is also being transmitted to the students. The teacher's body language, physical appearance, eye contact, facial expression, and tone of voice provided significant information to the students. Students' facial expressions inform teachers about their interest and involvement in the subject.<sup>6</sup>

Proxemics refers to the utilization of physical distance and space between the communicator and listener.<sup>5</sup> Kinesics are body movements that include speaker movements, clothing cues, and facial expressions. Oculosics is the utilization of eye contact/movement to communicate a message such as winking, dilatation and blinking of pupils during classroom interaction.<sup>3</sup> Chronemics is impact of time on communication, time perception, timeliness, and consideration of the length of time students are willing to

## INTRODUCTION

It is commonly misconceived that communication is solely comprised of verbal exchanges and auditory signals.<sup>1</sup> However, in actuality, communication encompasses both verbal and non-verbal transmission of information.<sup>2</sup> Communication included verbal spoken words (338%), non-verbal words that included voice tone (7%), and body language (55%).<sup>3,4</sup> Successful learning and teaching processes begin with establishing strong communication between students and their teachers.<sup>5</sup> The teacher-student relationship is

strengthened via efficient communication, which is beneficial for the teaching and learning processes and serves as a foundation for efficient cognitive growth. Proper usage of words directly affects the mind and body of students, which, in turn, helps build a healthy classroom environment based on mutual understanding of trust and respect.<sup>6</sup>

Non-verbal communication has been overlooked in medical education. Non-verbal communication has been overlooked in many academic disciplines, including medical and dental

listen.<sup>3</sup> Vocalics is study of voice and how it is utilized to convey a message, for instance through voice tone.<sup>9</sup>

One study showed that the quality of classroom education is improved by using non-verbal communication, which enhances students' cognitive aptitude and learning efficacy.<sup>10</sup> However, studies on non-verbal communication in medical education are limited and their contributions are related to students' learning processes. This study aimed to measure different facets of non-verbal communication among educators in undergraduate medical and dental classrooms.

## METHODS

For this study, an analytical cross-sectional design was used. The study was completed over a six-month period (from April 2022 to February 2023).

This study was conducted at two colleges: Shifa College of Dentistry and Shifa College of Medicine. Both are constituent colleges of Shifa Tamer-e-Milat University and offer a four-year dentistry program and a five-year Bachelor of Medicine, Bachelor of Surgery (MBBS) program. These colleges are implementing module-based integrated curricula and clerkships in the 4<sup>th</sup> and 5<sup>th</sup> years. The study population included Bachelor of Dental Surgery and MBBS students from 1<sup>st</sup> to 3<sup>rd</sup> years of medical and dental programs.

The sample size was 242, which was calculated using Rao Software. In this software, the acceptable margin of error was set at 5 % and the confidence level was 95 %. Stratified random sampling was used to select participants from a pool of medical and dental students.

This study was approved by the Institutional Review Board and Ethics Committee (IRB#: 0107-2022). Furthermore, consent from the ethical committee of the respective colleges and consent to approach the participants were obtained from the module director. APA ethical guidelines for conducting research were followed to preserve the rights of the study participants.

The first section consisted of the

demographic characteristics of participants' personal information, gender, age, and level of education. Section 2 contains questions related to the different patterns of Non-verbal Communication. A pre-validated questionnaire developed by a Saudi Arabian researcher was used for data collection. This data collection tool was comprised of the five subscales including proxemics (6-items), kinesics (5-items), oculosics (3-items), chronemics (3-items) and vocalics (3-items), altogether 20-items. Each item was rated on 5-points Likert scale (1=strongly disagree, 2=disagree, 3=uncertain, 4=agree, and 5=strongly agree).

The content validity index (CVI) and face validity index (FVI) were calculated to measure the extent to which experts agreed on the relevance and clarity of items in an instrument. Five medical educators performed the content and face validity, who reviewed the relevance of the content on a 4-point Likert scale: 1=least relevant, 4=most relevant, 1=least clear, and 4=most clear. The calculated CVI score were 0.80 and FVI 0.83, respectively, which were acceptable. Language of a few items has been revised for readability and clarity. The tool was administered to 30 medical and dental students for pilot testing. The Cronbach's alpha was 0.79, which is acceptable.

Data were collected using a self-administered questionnaire. The questionnaires were distributed to students by class representatives, not

the principal investigator, who served as a demonstrator in the study setting. This approach ensures an unbiased and credible data collection process. The students were given sufficient time to complete the questionnaire at their convenience. The completed questionnaires were retrieved by the same individuals who distributed them on the same and subsequent days.

Data were analysed using the Statistical Package for Social Sciences SPSS (version 26.0). The principal researcher entered the data and checked for missing or inaccurate ones. Demographic variables such as age, sex, program, and level of study were described in terms of frequency and percentage. The instrument items were tested for normality using the Shapiro-Wilk test, and a p-value > 0.05 was determined significant. The data did not meet the assumption of normality. Therefore, median, interquartile ranges, and Mann-Whitney U-test were applied to compare differences between gender, program and Kruskal-Wallis H-test and eta-squared for level of study groups.

## RESULTS

Of 242 medical and dental students, 229 completed and returned questionnaires. The response rate was 94.6 %. Notably, 147 of 229 participants were above the age of 20 years. In addition, most students were female (65 % of the sample). Moreover, 66 % and 33 % of students were from the MBBS and BDS, respectively.

**Table 1: Demographic characteristics of study participants (n=229)**

Variables		Percentage	Frequency
Age (years)	19-20	36	82
	> 20	64	147
Gender	Male	35	80
	Female	65	149
Program	MBBS	66	150
	BDS	34	79
Level of study	1 <sup>st</sup> years	34	78
	2 <sup>nd</sup> years	45	104
	3 <sup>rd</sup> years	21	47

MBBS: Bachelor of Medicine, Bachelor of Surgery; BDS: Bachelor of Dental Surgery

**Table II: Descriptive statistics of non-verbal communication subscale and items (n=229)**

Subscales and items	Median	IQR	
		25	75
<b>Proxemics</b>	<b>4.00</b>	<b>3.67</b>	<b>4.33</b>
1. Teachers' appreciation positively influences student motivation.	4.00	4.00	5.00
2. Teachers' affect impacts student engagement in the classroom.	5.00	4.00	5.00
3. Teachers' movement in class enhances student focus.	4.00	4.00	5.00
4. Teachers' prolonged positioning behind the rostrum is detrimental.	3.00	2.00	3.00
5. Teachers' hand actions help student understand discussions.	4.00	3.00	5.00
6. Teachers' smiles elicit motivation in students.	5.00	4.00	5.00
<b>Kinesics</b>	<b>4.20</b>	<b>3.80</b>	<b>4.60</b>
7. Teachers' demeanor fosters a conducive learning environment.	5.00	4.00	5.00
8. Teachers' positive head movements encourage student participation.	5.00	4.00	5.00
9. Teachers' interest enhances student interest in the lesson.	3.00	3.00	4.00
10. Students feel discomfort when teachers point them with an finger.	4.00	3.00	5.00
11. Teachers' professional appearance elicits positive changes in students.	4.00	4.00	5.00
<b>Ocuesics</b>	<b>4.33</b>	<b>3.33</b>	<b>4.33</b>
12. Teacher-student eye contact increases student engagement.	4.00	3.00	5.00
13. Teachers' eye contact should be equitably distributed among students.	4.00	4.00	5.00
14. Teachers' prolonged gaze negatively affects student confidence.	3.00	3.00	4.00
<b>Chronemics</b>	<b>4.67</b>	<b>4.00</b>	<b>5.00</b>
15. Teachers' consistency and punctuality enhance student interest.	5.00	4.00	5.00
16. Teachers' time management is a crucial nonverbal communication.	5.00	4.00	5.00
17. Teachers' interaction timing and frequency impact student learning.	5.00	4.00	5.00
<b>Vocalics</b>	<b>4.33</b>	<b>4.00</b>	<b>5.00</b>
18. Teachers' gentle vocal tone encourages student participation	5.00	4.00	5.00
19. Teachers' vocal pitch aids in maintaining student attentiveness.	4.00	4.00	5.00
20. Teachers' vocal clarity enhances student comprehension.	5.00	4.00	5.00

\*IQR interquartile range

Further details of the demographic variables are presented in Table I.

Table II presents different facets of non-verbal communication. Proxemics subscale was one of the low rated subscale (median 4.00; IQR 3.67-4.33). The lowest rated item in this subscale was 'teachers' prolonged position

behind the rostrum was detrimental for communication in the class (median 3.00; IQR 2-3). High rated items were the mood of the teacher impact engagement (median 5; IQR 4-5), and the teacher's smile elicited motivation (median 5; IQR 4-5). Students favorably rated the kinesics of the teachers

(median 4.20; IQR 3.80-4.60). The lowest-rated item was teachers' interest in enhancing students' interest in class (median 3; IQR 3-4). Students rated deameanors that foster a conducive learning environment and positive head movements that encourage student participation in the class highly (median 5; IQR 4-5). Ocuesics was among the low rated subscale (median 4.00; IQR 3.33-4.33). The lowest rated item for ocuesics was the prolonged gaze of the teacher, which negatively affected students' confidence (median 3; IQR 3-4). Chronemics had the highest-rated subscale (median, 4.67; IQR 4-5). Chronemic components, including punctuality, time management, timing, and frequency of interaction with students, were highly rated (median 5; IQR 4-5). Vocalics was the second highest-rated facet of non-verbal communication (median 4.33; IQR 4-5). Students rated that gentle vocal, tone, and pitch aided their class participation, attentiveness, and comprehension.

Table III shows the gender comparison with different non-verbal communication facets, considering the median values of Proxemics, Chronemics, and Vocalics, which are the same for both. For Kinesics, the median value for men was lower (median 4.00; IQR 3.80-4.55) than for women (median 4.20; IQR 3.80-4.60) and 0.15 effect size. Similarly, for ocuesics, the median value for men (median 3.66; IQR 3.33-4.33) was lower than that for women (median 4.00; IQR 3.66-4.33) and 0.19 effect size.

Table IV shows a comparison of program differences between BDS and MBBS, with the median values of proxemics and vocalics being the same (4.00 and 4.33, respectively) and a medium effect size. For Kinesics, the median value of MBBS (median, 4.20; IQR 3.80-4.60) was higher than that of BDS (median, 4.00; IQR 3.80-4.40). Similarly, for ocuesics, the median value of MBBS (median, 4.00; IQR 3.33-4.33) was higher than that of BDS (median, 3.33; IQR 3.33-4.33). For chronemics, the median value of the BDS (median 4.66; IQR 4.00-5.00) was higher than that of the MBBS (median 4.33; IQR 3.91-5.00).

**Table III: Comparison of gender with non-verbal communication facets/types**

Non-verbal communication subscales	Male (n=80)	Female (n=149)	U-Test	Cohen's d
	Median (IQR)	Median (IQR)	P-Value	
Proxemics	4.00 (3.66-4.33)	4.00 (3.66-4.33)	0.988	0.01
Kinesics	4.00 (3.80-4.55)	4.20 (3.80-4.60)	0.294	0.15
Oculesics	3.66 (3.33-4.33)	4.00 (3.66-4.33)	0.174	0.19
Chronemics	4.66 (3.75-5.00)	4.66 (4.00-5.00)	0.709	0.08
Vocalics	4.33 (4.00-5.00)	4.33 (4.00-5.00)	0.352	0.18

\*P-Value significance &lt; 0.05; IQR interquartile range

**Table IV: Comparison of program with non-verbal communication variables**

Non-verbal communication subscales	BDS (n=79)	MBBS (n=150)	U-Test	Cohen's d
	Median (IQR)	Median (IQR)	P-Value	
Proxemics	4.00 (3.66-4.33)	4.33 (3.66-4.33)	0.910	0.29
Kinesics	4.00 (3.80-4.40)	4.20 (3.80-4.60)	0.585	0.12
Oculesics	3.66 (3.33-4.33)	4.00 (3.33-4.33)	0.393	0.12
Chronemics	4.66 (4.00-5.00)	4.46 (3.91-5.00)	0.733	0.05
Vocalics	4.33 (4.00-4.46)	4.33 (4.00-5.00)	0.470	0.06

\*P-Value significance &lt; 0.05; IQR interquartile range MBBS: Bachelor of Medicine, Bachelor of Surgery; BDS: Bachelor of Dental Surgery

**Table V: Comparison of level of study with non-verbal communication variables**

Non-verbal communication subscales	1 <sup>st</sup> Year (n=78)	2 <sup>nd</sup> Year (n=104)	3 <sup>rd</sup> Year (n=47)	**H-test	Eta-squared
	Median (IQR)	Median (IQR)	Median (IQR)	p-value	
Proxemics	4.00 (3.67-4.17)	4.08 (3.67-4.33)	4.17 (3.83-4.33)	0.330	0.01
Kinesics	4.00 (3.80-4.40)	4.20 (3.80-4.60)	4.20 (3.80-4.60)	0.049	0.15
Oculesics	3.67 (3.33-4.00)	4.00 (3.33-4.33)	4.00 (3.67-4.33)	0.226	0.19
Chronemics	4.67 (3.67-5.00)	4.67 (4.00-5.00)	4.67 (4.00-5.00)	0.606	0.08
Vocalics	4.33 (4.00-5.00)	4.33 (4.00-5.00)	4.33 (4.00-5.00)	0.275	0.18

\*P-Value significance &lt; 0.05; IQR interquartile range; \*\*Kruskal-Wallis H-test

3<sup>rd</sup> year students rated proxemics, kinesics, oculesics, chronemics, and vocalics higher than 2<sup>nd</sup> and 1<sup>st</sup> year students and significant differences were found in kinesics ( $p = 0.049$ ), and the effect size for non-verbal communication subscales was small (Table V).

## DISCUSSION

The findings revealed that chronemics,

as a facet of non-verbal communication, were mostly used by medical and dental students, followed by vocalics and kinesics. These findings are consistent with those of studies among pharmacy foreign language students.<sup>16,17</sup> Students in junior classes (1<sup>st</sup> and 2<sup>nd</sup> years), female sex, and MBBS preferred more kinesics. Medical and dental students give more importance to chronemics, as they are a facet of professionalism,

organizing the self. Teachers' activities and schedules during chronemics can help students manage their personal and professional activities. The effect of chronemics enhances student satisfaction.<sup>8</sup>

Kinesics is considered imperative for communicating through gestures and body language embodied in emotions. One Saudi study reported kinesics as the most effective and inseparable part of a lecture room's learning and teaching process.<sup>17</sup> This study further highlights that instructors who effectively utilize kinesics can create a more dynamic and interactive learning environment, fostering better communication with their students.<sup>17</sup> Moreover, students attuned to their instructors' non-verbal signals may be better equipped to grasp complex concepts and retain information more effectively. Younger and female students' inclination towards kinesics may be driven by their involvement in classroom activities, and older students may prefer to engage in discussions and debates.

Similar findings regarding proxemics have reported that students grasp the lecture more when seated close to the teacher.<sup>6</sup> Another research supports the idea that approaching pupils closely communicates the teacher's desire to listen to them while also posing a threat to their personal space. This is more pertinent to the opposite gender. The medium effect size in the current study indicates that some students are sensitive to proxemics. One study reported the effect of opposite gender in personal space and distance.<sup>18</sup> This effect was more pronounced in certain cultural contexts, suggesting that social norms and cultural expectations played a significant role in shaping personal space boundaries between genders.<sup>8</sup>

The vocabulary findings were also comparable in that the teachers were more effective when they altered the tone, pitch, volume, and rhythm of their lecture related to various contexts in class, whereas in lessons where the teacher had a monotonous tone or manner, the students became bored.<sup>6</sup> Therefore, this claim infers that lecturers who employ diverse paralanguages are successful. One study reported that the monotonous tone of



the teacher was the main reason for boredom in lectures.<sup>18</sup> This issue can be particularly problematic in longer class sessions, where a lack of vocal variety can exacerbate feelings of fatigue and disinterest. To address this problem, educators should strive to incorporate vocal dynamics, such as changes in pitch, volume, and pacing, to create a more engaging and stimulating learning environment.

One study supported the oculesics findings that by maintaining eye contact, educators can keep students' attention and prevent them from drifting off tasks. Moreover, students feel valued and more eager to pay attention to what teachers say when making eye contact.<sup>19</sup> Teachers who make eye contact are often viewed as accessible and friendly.<sup>20</sup> This positive perception can lead to increased student engagement and participation in class discussion. Students may feel more comfortable asking questions and sharing ideas when they feel their teacher is attentive and approachable.

Students indicated how they perceived the different communication cues. Proxemics, kinesics, and oculesics had low-to-medium effect sizes in the current study. The relatively modest impact of these non-verbal communication elements suggests that other factors influence interpersonal interactions. Future research could explore the interplay between verbal and non-verbal cues to gain a more comprehensive understanding of the communication dynamics. Additionally, cultural differences in the interpretation and use of proxemics, kinesics, and oculesics warrant further investigation to determine their influence on observed effect sizes.

Teachers should be aware of non-verbal communication and be conscious of their employment. They must maintain adequate eye contact, distance, posture, body language, speech tone, timing, and facial expressions. Non-verbal signals are powerful tools for both classroom instruction and effective management. Consequently, they should be carefully employed to enhance classroom instruction. The science of non-verbal communication should be further explored.

## Limitations of the study

Data related to this study were acquired from a private medical and dental college that employed an integrated modular system. Therefore, these findings should be cautiously applied in different contexts. Variables related to haptics were not mentioned in the data collection, which is another limitation that could be a focus of future research.

## CONCLUSION

This study demonstrated the significant impact of non-verbal communication in medical and dental education classrooms. Chronemics emerged as the preferred facet, followed by vocalics, and kinesics. Females, 3<sup>rd</sup> year and MBBS students showed a greater preference for kinesics. This research highlights the importance of educators being mindful of their non-verbal cues, as they can positively influence student learning and classroom management when used appropriately. However, improper use may demotivate students and negatively affect their learning experience. This study suggests that student preferences and comfort levels should be considered. Further investigation of the science of non-verbal communication in medical education is warranted to enhance teaching effectiveness and student engagement.

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### AUTHORS' CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

**SK:** Conception and study design, acquisition, analysis and interpretation of data, drafting the manuscript, critical review, approval of the final version to be published

**AJP:** Conception and study design, acquisition, analysis and interpretation of data, critical review, approval of the final version to be published

**GV:** Study design, critical review, approval of the final version to be published

**GMJB:** Acquisition, analysis and interpretation of data, critical review, approval of the final version to be published

*Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.*

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Authors declared no conflict of interest, whether financial or otherwise, that could influence the integrity, objectivity, or validity of their research work.

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The data that support the findings of this study are available from the corresponding author upon reasonable request



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