

RESEARCH ARTICLE

Medical Students' Performance in Viva Voce: Reflection of Learning Approach and Performance in Other Components of the Examination

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Abstract

Background: The viva voce examination is a formal test evaluation procedure in Nigerian medical school, that is used to assess person's knowledge. The relationship between this types of examination and learning approach is not fully elucidated. Therefore, this study was to determine the relationship between medical and dental students' performance in viva voce with learning approach and other forms of examinations.

Method: A total of 125 students participated in the study which is meant to assess their learning approach. However, 64 students (Medical (MBBS) =44 and Dental (BDS) =20) were further evaluated for the relationship between viva voce and learning approach and other components of the exams. Deep and superficial approaches to learning were determined using the Biggs's revised two-factor study process questionnaire (2R-SPQ). The students' performance in Anatomy professional examination was also retrieved from departmental examination records. Pearson correlation and regression analyses were used to determine the relationship between learning approaches and performance in viva voce examination.

Results: The mean score for deep learning and superficial learning approaches of the student were 37.5 ± 7.70 and 27.92 ± 8.9 respectively. Superficial approach ($r = 0.355$, $P = 0.004$) and superficial learning ($r = 0.283$, $P = 0.023$) were found to correlate positively with students' performance in viva voce. However, a significant negative correlation was noted with respect to deep learning approach ($r = -0.247$, $P = 0.049$). Students' performance in viva voce was observed to correlate significantly with MCQs ($r = 0.278$, $P = 0.026$) and practical ($r = 0.297$, $P = 0.018$) components of the examination. An estimate of 1.05 (95% CI of $\beta = -2.103$ to -0.003 , $P < 0.049$) unit decrease in viva voce scores indicates students with deep learning, whereas 1.465 (95% CI of $\beta = 0.207$ to -2.723 , $P < 0.023$) unit increase in viva voce scores indicates students with superficial learning.

Conclusion: The viva voce examination was demonstrated to be a tool that can be used to determine students' learning approach as well as performance in some components of their professional examination. However, further studies with larger sample size and different group of students may be needed to check the role of viva voce in understanding learning approach of a particular student for a better academic performance.

Keywords: Medical students, Anatomy Examination, Bayero University, Viva voce

INTRODUCTION

Anatomy is one of the medical sciences needed by medical professionals during their training and practice with the

main aim of its application during clinical practice (Sugand et al., 2010). In order to ensure safe and efficient clinical practice, clinicians in all disciplines must have an excellent

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knowledge of anatomy (Turney, 2007). Anatomic knowledge is likewise becoming increasingly important with the widespread utilization of sophisticated imaging techniques (McCuskey *et al.*, 2005). As one of the basic medical sciences, Anatomy is believed to play a dynamic role in diagnostic reasoning and therapy in most specialties (Spencer *et al.*, 2008). Health professionals are taught human anatomy for the first time when they start medical school for them to understand the language of medicine. While the method of teaching is essential, the learning approach they adopt is equally essential in achieving the desired goals.

An examination is the process of evaluation of the knowledge of a person. The evaluation can be in the form of a formal test with or without the assessment of performance skills. It is stated by Kelly, (2004) in Singh *et al.* (2022) that, 'Everybody is a genius. But if you judge a fish for its ability to climb a tree, it will live its whole life believing that it is stupid'.

Biggs *et al.* (2001), defines learning as the strategy that students undertake to organize and assimilate learning matter. However, the effort and time put into learning is highly influenced by the type and relevance of assessment (Gibbs, 2006; Norcini *et al.*, 2011; Al-Kadri *et al.*, 2012; Robyn *et al.*, 2019). MCQs are commonly used for assessment of exams. So, creating and practicing MCQs by the students might provide another opportunity for students to boost their learning (Touissi *et al.*, 2022). Co-creation by students has a statistically significant impact on their academic performance in relevant topics at the end of semester exam (Doyle and Buckley, 2020).

Learning approaches are conceived from the work of Marton and Säljö's (1976), where learning was categorized into deep understanding and surface recognition of facts. The idea was further developed by Entwistle and Ramsden's (1983), where each entity was described and a third category of learning approach was introduced: the strategic learner. According to their findings, learners who adopt deep approach exhibit vigorous and critical interaction with knowledge content, relate ideas to their previous knowledge and experience, try to discover new information using organizing principles to integrate ideas and make their conclusions based on evidence. Strategic learners are similar to deep learners but they always have the goal of achieving ranks, as their strategy is driven by being best at everything they do. On the other hand, surface approach learners are

driven by an immediate desire to pass exams or test. They recognize and memorize facts as they are without any attempt to fully understand them (Entwistle and Ramsden's 1983; Booth *et al.*, 1999). Researchers throughout the world assessed learning approach of medical students (Shah *et al.*, 2016; Cebeci *et al.*, 2013) while in Pakistan Rehman *et al.* (2016) investigated the same parameters in medical students.

Medical students adopting deep approach perform better academically with their scores on the higher 4th percentile than those who adopted surface approach who were found majorly on the lower percentile (Win *et al.*, 2012). They also had higher rating as medical professionals and tend to progress faster in their profession (Lindblom-Ylänne and Lonka, 1999). Students adopting inconsistent learning approaches were found to perform poorly in an exam (Meyer, 2000). Studies have highlighted the influence of type of examination on the learning approach by students. Van-Lohuizen *et al.* (2009), showed that medical students adopting strategic learning approach performed much better in OSCE type of examination than those that adopted deep approach or with a surface approach (Van-Lohuizen *et al.*, 2009). Moreover, BDS students demonstrated deep learning behavior through mitigating their negative thinking, memorizing learned material, self-assessment of their work and clarifying concepts by making association among themes to better understand the acquired knowledge and impression about subjects (Nabiha *et al.*, 2021). Passing the exit Doctor of Medicine/Diplomate of National Board examination is a significant but challenging milestone in the career of any student and a strong knowledge base is the foundation on which a student can build an impactful performance (Singh *et al.*, 2022). Knowledge core is tested in the theory part of the examination and its application to patient care during case presentations and viva in the practical examination. Performance during practicals has one common denominator: convincing the examiner that the patient during anaesthesia would be safe in the student's hands (Singh *et al.*, 2022). The aim of this study was to determine the relationship between medical and dental students' performance in viva voce with learning approach and other forms of examinations.

MATERIALS AND METHODS

Study Participants

Third year medical students at Bayero University Kano, College of Health Sciences were invited to participate in this study. A total of 125 participants, 80 (64%) males, and 45

(36%) females participated in the study for the assessment of students' learning approach. However, 64 students (44 Medical (MBBS) and 20 Dental (BDS)) were further evaluated to find relationship of learning approach and components of the exams. Written informed consent was obtained from each participant. All of the students gave their consent for the study.

Study Design

This was a cross-sectional research study which aims to explore the relationship between students learning approaches and their academic performance in a professional examination. Students were asked to complete R-SPQ-2F questionnaire, and the result was compared to their performance in the last MB examination.

Instrument

The students' learning approach was assessed by using the revised two-factor study process questionnaire (R-SPQ-2F). The R-SPQ-2F comprises of 20 statements to which students respond using a 5point Likert Scale (never true of me-1, rarely true of me-2, true of me half of the time-3, true of me most of the time-4 and always true of me-5). The questionnaire has two scales, DA and SA. With each scale having two subscales, deep strategy and deep motivation, surface approach surface motivation. Score on the questionnaire is categorized based on the percentiles, thus, if a score falls on 1st-3rd percentiles it is considered below average, 4th-7th is an average score, 8th-10th is above average. When a score is below average, it is denoted negative (-), when it is average, it is denoted zero (0) and when it is above average, it is denoted plus (+). Individual's score is then computed so that students can have different characteristics as follow:; deep exclusive when a student scores above average deep learning and below the average surface learning, deep predominant when he/she scores above average deep learning and average surface learning, surface exclusive is when he/she scores above average in surface learning and below averages deep learning and surface predominant when he/she scores above average surface learning and average deep learning. R-SPQ-2F was chosen for its easy administration and more applicability in tertiary institutions of learning (Biggs et al., 2001).

Table 1, shows the interpretation of R-SPQ-2F score. A student with an exclusive deep approach to learning obtains deep approach score of 50 and a very low superficial approach score of 10 of responses. Conversely, a student with an exclusive surface approach to learning should obtain

a higher superficial approach score of 50 with a very low deep approach score of 10.

Table 1: Interpretation of R-SPQ-2F

Learning Approach	DA Score (POINTS)	SA Score (POINTS)
Deep Exclusive	35-50	0-10
Deep Predominant	25-35	11-25
Superficial Exclusive	35-50	0-10
Superficial Predominant	25-35	11-25

In the MBBS/BDS program at Bayero University Kano, there are six levels of study and only students at levels 200 and 300 offer anatomy as a core course. Students in level 300 have covered most of the anatomy course with the exception of neuroanatomy, and have taken their first professional MB examination, which consists of MCQ, short answer questions (SAQs), practicals and viva-voce. The exams questions cut across embryology, histology and gross/clinical anatomy. The final result used was cumulative from their first semester which serves as continuous assessment.

Statistical Analysis

The data were expressed as mean ± SD, frequency and percentages. Then Cronbach's Alpha test for reliability and Shapiro-Wilk test of normality were run on the student's responses on the R-SPQ-2F. Pearson correlation analysis was used to determine the relationship between deep approach and motivation, superficial approach and motivation and performance in viva voce examination. Regression analysis was employed to determine the unit increase in viva voce that explains the type of students' learning approach. The analysis was done using SPSS version 20.0 Chicago, IL, USA. $P < 0.05$ was considered significant.

RESULTS

Table 2 shows the response rate of 125 (82.8%) in the study. The results from Shapiro-Wilks test shows that the data were not normally distributed ($P < 0.001$) as shown in Table 2. Cronbach's Alpha value was 0.70 for DA (deep learning) and 0.65 for SA (superficial learning).

Table 2: Test of Normality on Types of Students' Learning Approaches

Learning Approach	Shapiro-Wilks Test of Normality		
	Statistic	Df	P
Deep Approach	0.60	125	<0.001
Superficial Approach	0.63	125	<0.001

Table 5: Correlation Matrix of Learning Approach and Academic Performance of the Medical and Dental Students in Bayero University Kano

	VIVA (10%)	CA (40%)	SAQ (20%)	MCQ (20%)	PRACTICAL (10%)	FINAL EXAMS	DA	DM	SA	SM	DL/50	SL/50
VIVA (10%)	1	0.202	0.16	0.278*	0.297*	0.456**	-0.231	-0.208	0.355**	0.146	-0.247*	0.283*
CA (40%)	0.202	1	0.570**	0.673**	0.631**	0.854**	-0.025	-0.048	0.167	-0.03	-0.042	0.078
THEORY (20%)	0.16	0.570**	1	0.659**	0.481**	0.790**	0.024	-0.061	0.091	-0.141	-0.025	-0.027
MCQ (20%)	0.278*	0.673**	0.659**	1	0.637**	0.865**	-0.101	-0.013	0.125	-0.147	-0.06	-0.011
PRACTICAL (10%)	0.297*	0.631**	0.481**	.637**	1	0.759**	-0.1	0.017	0.026	-0.195	-0.041	-0.094
FINAL EXAMS	0.456**	0.854**	0.790**	.865**	0.759**	1	-0.083	-0.082	0.190	-0.084	-0.093	0.062
DA	-0.231	-0.025	0.024	-0.101	-0.100	-0.083	1	0.564**	-0.136	-0.176	0.862**	-0.176
DM	-		-0.061	-0.013	0.017	-0.082	0.564**	1	-0.402**	-0.418**	0.905**	-0.462**
SA	0.208hhh	-0.048							1	0.570**	-0.317*	0.888**
SM	0.355**	0.167	0.091	0.125	0.026	0.19	-0.136	-.402**	0.570**	1	-0.348**	0.884**hh*
DL/50	0.146	-0.03	-0.141	-0.147	-0.195	-0.084	-0.176	-.418**	0.570**	1	1	-0.375**
SL/50	-0.247*	-0.042	-0.025	-0.06	-0.041	-0.093	0.862**	0.905**	-0.317*	-0.348**	1	1
	0.283*	0.078	-0.027	-0.011	-0.094	0.062	-0.176	-0.462**	0.888**	0.884**	-0.375**	1

CA=Continuous Assessment; Short Answer Questions (SAQs); MCQ=Multiple Choice Questions; DA=Deep Approach; DM=Deep Motivation; SA=Surface Approach; SM=Surface Motivation; DL=Deep Learning, SL=Superficial Learning, * $P < 0.05$, ** $P < 0.01$

Table 6: Relationship of Learning Approach and Performance in Viva Voce

Dependent Variable	Unstandardized Coefficients					95% CI for β	
		B	SE	T	P Value	Lower	Upper
DL	(Constant)	43.882	2.944	14.91	<0.001	37.998	49.766
	VIVA (10%)	-1.053	0.525	-2.01	0.049	-2.103	-0.003
SL	(Constant)	19.377	3.528	5.49	<0.001	12.324	26.429
	VIVA (10%)	1.465	0.63	2.33	0.023	0.207	2.723

DL= deep learning; SL= superficial learning; CI=Confidence interval

Table 6 shows a relationship of learning approach and performance in viva voce. An estimate of 1.05 (95% CI of $\beta = -2.103$ to -0.003 , $P < 0.049$) unit decrease in viva voce scores shows students with deep learning, whereas 1.465 (95% CI of $\beta = 0.207$ to -2.723 , $P < 0.023$) unit increase in viva voce scores shows students with superficial learning.

Table 3: Test of Internal Consistency of Items of the R-SPQ-2F Questionnaire

Learning Approaches	Cronbach's Alpha	Cronbach's Based on Standardized Items	Alpha	No of Items
Deep Approach	0.69	0.70		10
Superficial Approach	0.65	0.65		10

Table 4 shows the learning approach score of the medical and dental students in Bayero University Kano. It was observed that the mean score for DA (37.5±7.70) is higher than that of SA (27.92±8.9). The students' scores in deep strategy was higher than that of superficial strategy. Similar trend was observed between deep motivation and surface motivation

Table 4: Learning Approach score of the Medical and Dental Students in Bayero University Kano

Items	Mean ±SD	Minimum	Maximum	Total
DA Score				
Deep Strategy	19.16±3.82	6	25	37.5±7.70
Deep Motivation	18.34±3.97	4	25	
SA Score				
Surface Strategy	12.41±4.60	3	25	27.92±8.9
Surface Motivation	15.51±4.51	2	25	

SD= standard deviation, DA = deep approach, SA= surface approach

Table 5 shows a correlation of learning approach and academic performance. Superficial approach ($r= 0.355, P=0.004$) and superficial learning ($r= 0.283, P=0.023$) were found to correlate positively with students' performance in viva voce. However, a significant negative correlation was noted with respect to deep learning approach ($r=-0.247, P=0.049$). Students' performance in viva voce was observed to correlate significantly with MCQs ($r= 0.278, P=0.026$) and practical ($r=0.297, P=0.018$) components of the examination with no significant correlation with the short answer questions component ($r=0.16, P=0.206$).

DISCUSSION

Viva voce is one of the components of the final cumulative examination in many medical colleges (Wakeford et al.,

1995). It is usually conducted as face-to-face interaction between the student and the examiner. This provides a unique opportunity to test interactive skills, which cannot be assessed by other components of the examination (Newble and Cannon, 1987). Several factors such as anxiety, poor agreement between examiners, variation in questions asked from candidate to candidate among others have been reported to influence students' performance in viva voce (Holloway et al., 1967; Thomas et al., 1993). But the role of the students' learning approaches on the performance in viva voce receives less attention in the literature. Hence, the present study examines the average learning score of the medical and dental student in Bayero University Kano. The relationship between students' performance in viva voce and learning approach and other forms of examinations was also evaluated.

The mean score for deep approach was higher than that of superficial approach among the medical and dental students in Bayero University. There was no exclusive deep or surface learner among the respondents. This indicated that students predominantly use deep approach but may switch to superficial approaches depending on the circumstances. It was suggested that most of the student use deep approach with the intention to understand their courses, and when they want to achieve good grades, they use strategic approach (Hasnor et al., 2013). But a previous study demonstrated that deep approach to learning did not result in higher grades on the evaluation even though this approach was related to high quality learning outcomes (Minbashian et al., 2004). This indicate that even though the learning approach is important, other factors need to be assessed in determining the role of learning approach adopted by students in achieving academic success. This can be supported by the fact that variables such as age, prior educational attainment and conscientiousness were reported to significantly accounted for 24.1% of the variance in academic performance (Duff et al., 2002).

In an earlier study, it was reported that deep and superficial approaches to learning have direct effects on academic performance (Diseth et al., 2010). The study further indicated that learning approach is an independent predictor of test performance. Similarly, deep and superficial approaches to learning are important predictors of academic performance (Choy et al., 2012). The degree of this association was found to be strong, according to the findings by Ekinici, (2009). However, other studies observed a relatively weaker but positive correlation between deep approach and academic performance (Diseth, 2007). In

contrast, Rosenthal (2012) reported a negative correlation between academic achievement and deep learning approach. In respect of superficial approach, Diseth (2002) found a negative correlation between academic performance and superficial learning. Also, Lizzio *et al.* (2002) determined that the surface learning approach is a better predictor of GPAs than deep approaches to learning among college students. Burton and Sztaroszta (2007) found that deep approaches to learning cannot positively predict academic achievement. Therefore, relationship between deep (negative) and superficial (positive) approaches with viva voce observed in the present study indicate inconsistency in findings. Though, this may be affected by different types of causes/subjects considered and different measures of academic performance.

The other components of the examination, even though they correlated with viva voce, show no significant correlation with learning approaches. This indicates limitation of learning approach in prediction of students' performance in significant components and overall examination. This scenario was demonstrated by Duff *et al.* (2003), who found a non-significant relationship between learning and academic performance in their study, which also established that learning approach is a weak predictor of students' performance. This was later supported by Salamonson *et al.* (2013), on assessment of learning approaches as predictors of academic performance in first-year health and science students. However, single method of assessment is unable to assess all the attributes required to become a competent health professional. A systems-based framework has been suggested to blend single assessments in order to achieve the most benefit for all stakeholders (Norcini *et al.*, 2018). Educators need to utilise the assessment framework effectively in the development of assessment tasks in order to encourage learning and keep students engaged (Robyn, 2020).

Moreover, in a study conducted by Adamu *et al.* (2018), it was reported that MCQs (multiple choice questions) is the preferred examination format for Bayero University medical and dental students, as it reflects the overall performance of the students despite significantly higher scores in SAQs (short answer questions) compared to MCQs observed in the study. Other confounders also need attention due to their established role in academic success of students. It is worth highlighting that knowing the most adopted learning approaches of the student may help in mounting more strategies that provide useful resources and guides for promotion of the quality of study outcome. An insight on the strength and weakness of components of the examination,

as applied to the outcome, can be projected from this study. This may lead to useful adjustment where necessary with the overall aim of improving the quality student assessment and learning outcomes.

CONCLUSION

In conclusion, the viva voce examination was examined as a tool that can be used to determine student's learning approach as well as performance in some components of their professional examination. It was also discovered that students with superficial learning approach perform better in viva voce. And although other components correlated with viva voce, they show no significant correlation with learning approaches. However, further studies with a larger sample size and different group of students may be needed to check the role of viva voce in understanding learning approach of particular students for a better academic performance.

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CONFLICT OF INTEREST

No conflict of interest was declared by the author

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AUTHORS CONTRIBUTIONS

Conception and design of study: LHA, MGT, AHY.

Acquisition of data: LHA, AHY.

Analysis and interpretation: LHA, AHY, MGT.

Drafting the manuscript: AHY, LHA, RS, MKR

Revising the manuscript critically for important intellectual content: LHA, RS, MKR

Approval of the version of the manuscript to be published: LHA, RS, MKR

REFERENCE

- Adamu, L.H, Yusuf, A.H, Taura, M.G. (2018). Differences in multiple choice and short answer questions performance among medical and dental trainees as reflected in their anatomy course. *Journal of Contemporary Medical Education*. DOI: 10.5455/jcme.20170706060134
- Al-Kadri, H. M., M. S. Al-Moamary, H. Al-Takroni, C. Roberts, and C. P. van der Vleuten. (2012). "Self-assessment and students' study strategies in a community of clinical

- practice: A qualitative study." *Medical Education Online* 17 (1): 11204. doi:10.3402/meo.v17i0.11204.
- Biggs, J., Kember, D., Leung, D. (2001). The revised two-factor study process questionnaire: R-SPQ-2F. *British Journal of Educational Psychology*, 71(1): 133- 149.
- Booth, P., Luckett, P., Mladenovic, R. (1999). The quality of learning in accounting education: The impact of approaches to learning on academic performanc", *Accounting Education: An international journal*, 8(4) 277-300
- Burton and Sztaroszta (2007). The relationship among conceptions of knowledge, approaches to learning, personality, and academic success. In *Proceedings of the 42nd Australian Psychological Society Annual Conference: Psychology Marking an Impact* (pp.47-51). Australian Psychological Society.
- Cebeci, S., Dane, S., Kaya, M., Yigitoglu, R. (2013). Medical students' approaches to learning and study skills. *Procedia – Social and Behavioral Sciences*; 93:732-736.
- Choy, J.L.F., O'Grady, G., & Rotgans, J.I. (2012). Is the Study Process Questionnaire (SPQ) a good predictor of academic achievement? Examining the mediating role of achievement related classroom behaviours. *Instructional Science* .40, 159–172
- Diseth A. (2007). Approaches to learning, course experience and examination grade among undergraduate psychology students: Testing of mediator effects and construct validity. *Studies in Higher Education*, 32:373 – 388
- Diseth, A (2002). The relationship between intelligence, approaches to learning and academic achievement. *Scandinavian Journal of Educational Research* 46, (2). 219-230.
- Diseth, A., Pallesen, S., Brunborg, G.S., and Larsen, S. (2010). Academic achievement among first semester undergraduate psychology students: The role of course experience, effort, motives and learning strategies. *Higher Education*. 59(3), 335-352.
- Doyle, E., and Buckley, P. (2020). The impact of co-creation: an analysis of the effectiveness of student authored multiple choice questions on achievement of learning outcomes. *Interactive Learning Environments*, DOI: 10.1080/10494820.2020.1777166.
- Duff, A., Boyle, E. and Dunleavy, K. (2002). "The relationship between personality, approach to learning, emotional intelligence, work attitude and academic performance." In *The 7th Annual ELSIN Conference, Academia Press Scientific Publisher*. pp. 141-51
- Duff, H., Boyle, E., Dunleavy, K., Ferguson, J (2003). The relationship between personality, learning approach and academic performance. *Personality and Individual Differences an International Journal of Scientific and Research Publications*, 36,1907–1920.
- Ekinci, N (2009). Learning Approaches of University Students. *Education and Science*,34(2):. 151-154-
- Entwistle, N. and Ramsden, P. (1983) *Understanding Student Learning*, London: *Croom Helm*:35-55.
- Gibbs, G. (2006). How assessment frames student learning." In *Innovative Assessment in Higher Education*, edited by C. Bryan & K. Clegg, 23–36. London: Routledge.
- Hasnor H.N, Ahmad Z, Nordin, N (2013). The relationship between learning approaches and academic achievement among Intec students, Uitm Shah Alam, *Procedia - Social and Behavioral Sciences* 90 178 – 186
- Holloway P.J, Hardwick J.L, Morris J, Start K.B (1967). The validity of essays and viva voce examining techniques. *Br. Dental J.* 123: 227- 32
- Kelly, M. (2004). The rhythm of life: Living every day with passion and purpose. Quote page 80, *Fireside, New York* (Google books preview).
- Lindblom-Ylänne, S. and Lonka K. (1999). Individual ways of interacting with the learning environment – Are they related to study success? *Learning and Instruction*, 9,1-18.
- Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice. *Studies in Higher Education*,27, 27-52.
- Marton, F., and Säljö, R. (1976). On qualitative differences in learning. I – Outcome and process' *British Journal of Educational Psychology*, 46: 4-11
- McCuskey, R.S., Carmichael, S.W., Kirch, D. (2005). The importance of anatomy in health professions education. *Journal of American Academic Medicine*; 80:349–351
- Meyer, J.H.F. (2000). An empirical approach to the modelling of dissonant study orchestration in higher education. *European Journal of Psychology of Education (special edition)*, 15, 5-18
- Minbashian, A., Huon, G.F., and Bird, K.D. (2004). Approaches to studying and academic performance in short-essay exams. *Higher Education*, 47, 161-176.
- Nabiha, F.K., Muhammad, S., Ayesha, A., Arshad K.B. (2021). An updated insight into learning approach of government sector dental students in balochistan. *Proceedings S.Z.M.C.* Vol:35(4):pp.51-57, doi:10.47489/PSZMC-815354-51-57 <https://www.researchgate.net/publication/355980971>
- Newble, D and Cannon, R (1987). *A handbook for medical teachers*. 2nd edition. Lancaster: MTP Press
- Norcini, J., Anderson, B., Bollela, V., Burch, V., Costa, M. J., Duvivier, R., Galbraith, R., Hays, R., Kent, A., Perrott, V., and Roberts. T., (2011). Criteria for good assessment: consensus statement and recommendations from the Ottawa 2010 Conference." *Medical Teacher* 33 (3): 206–214. doi:10.3109/0142159X.2011.551559.
- Norcini, J., Anderson, B., Bollela, V., Burch, V., Costa, M. J., Duvivier, R., Hays, R., Mackay, M. F. P., Roberts, T., and Swanson. D., (2018.) 2018 consensus framework for good

- assessment." *Medical Teacher* 40 (11): 1102–1109. doi: 10.1080/0142159X.2018.1500016.
- Rehman, R., Ahmed, K., Rehan, R., Hassan, F., Syed, F. (2016). Learning approaches and performance of medical students. *J Pak Med Assoc.*; 66(2):198-202.
- Robyn, P., Monica, G., Kimberley, O., Poornima, R., Monika, Z., Bunmi, M. (2020). Exploring the impact of assessment on medical students' learning. *Assessment and Evaluation in Higher Education*, DOI: 10.1080/02602938.2019.1614145
- Rosenthal, J.L. (2012). Motives and methods: Motivation, learning approaches and academic achievement of students during first year transition to medical school. *University of Southern California*.
- Salamonson, Y., Roslyn Weaver, R., Chang, S., Koch, J., Bhathal, R., Khoo, C., & Wilson, I (2013). Learning approaches as predictors of academic performance in first-year health and science students. *Nurse Education Today*, 33:729–733.
- Shah, D.K., Yadav, R.L., Sharma, D., Yadav, P.K., Sapkota, N.K., Jha, R.K., Islam, M.N. (2016). Learning approach among health sciences students in a medical college in Nepal: A cross-sectional study. *Adv Med Educ Pract.*; 7:137-43. Doi: 10.2147/AMEP.S100968. PMID: 27019603; PMCID: PMC4786058
- Singh, B., Divatia, J.V., Samantaray, A., Malhotra, N., Kulkarni, S.S. (2022). Postgraduate examination: How to match your presentation skills with examiner's expectations? *Indian Journal of Anaesthesia*.66:58-63.
- Spencer, A.L., Brosenitsch, T., Levine, A.S., Kanter. S.L., (2008). Back to the basic sciences: An innovative approach to teaching senior medical students how best to integrate basic science and clinical medicine. *Journal of Academic Medicine*; 83:662-9.
- Sugand, K., Abrahams, P., Khurana, A. (2010). The anatomy of anatomy: A review for its modernization. *Anatomical Sciences Education*, 3(2), 83-93.
- Thomas C.S, Mellsop G, Callender J, Crawshaw J, Ellis PM, Hall A, et al (1993). The oral examination: A study of academic and non-academic factors. *Med. Educ.* 27: 433-439.
- Touissi, Y., Hjej, G., Hajjioui, A., Ibrahim, A., Fourtassi, M. (2022). Does developing multiple-choice questions improve medical students' learning? A systematic review, *Medical Education Online*, 27:1, DOI: 10.1080/10872981.2021.2005505
- Turney, B.W. (2007). Anatomy in a modern medical curriculum. *Annals of the Royal College of Surgeons of England*, 89(2), 104–107
- Van Lohuizen, M. T., Kuks, J. B. M., Van Hell, E. A., Raat, A. N., Cohen-Schotanus, J. (2009). Learning strategies during clerkship and their effects on clinical performance. *Medical Teacher*, 31, 494–499.
- Wakeford, R., Southgate, L., Wass, V. (1995). Improving oral examinations: selecting, training, and monitoring examiners for the MRCGP. *BMJ* 311: 931-935.
- Win, M., Eun-Kyung, C., Donna, E., Dixie, F. (2012). The relationship between medical students learning approaches and performance on a summative high-stakes clinical performance examination. *Medical Teacher*, 34:4, e236-e241, DOI:10.3109/0142159X.2012652995