PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 07 (July 2025)

Original Article

OPEN ACCESS

Level of Integration in Modular System Curriculum in Medical Colleges of KPK, Pakistan

Fawad Ahmed[1], Qari Muhammad Younas Aman[1], Jawairia Nawaz[2*], Laiba Zaman[3], Faiqa Asghar[4], Muhammad Hamza[5], Ramla Rani[6], Osama Sajid[7], Aiza Ismail[8] and Faiqa Iqbal[9]

[1]Department of Medicine, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan
[2]Department of Surgery, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan
[3]Northwest School of Medicine, Peshawar, Pakistan
[4]Khyber Medical College, Peshawar, Pakistan
[5]Saidu Medical College, Swat, Pakistan
[6]Gomal Medical College, Dera Ismail Khan, Pakistan
[7]Bacha Khan Medical College, Mardan, Pakistan
[8]Kabir Medical College, Peshawar, Pakistan
[9]Khyber Girls Medical College, Peshawar, Pakistan

ARTICLE INFO

Keywords:
Integrated Curriculum, Harden's Ladder, Medical Education, Faculty Perception

How to Cite:
Ahmed, F., Aman, Q. M. Y., Nawaz, J., Zaman, L., Asghar, F., Hamza, M., Rani, R., Sajid, O., Ismail, A., & Iqbal, F. (2025). Level of Integration in Modular System Curriculum in Medical Colleges of KPK, Pakistan: Integration in Modular System Curriculum. Pakistan Journal of Health Sciences, 6(7), 257-262. https://doi.org/10.54393/pjhs.v6i7.3089

***Corresponding Author:**
Jawairia Nawaz
Department of Surgery, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan
belief30@yahoo.com

Received Date: 21st May, 2025
Revised Date: 22nd July, 2025
Acceptance Date: 27th July, 2025
Published Date: 31st July, 2025

ABSTRACT

Integrated medical education links basic sciences with clinical exposure, enhancing critical thinking. The World Federation of Medical Education (WFME) standards now require integrated teaching for graduates seeking US residency. KPK implemented Harden's Ladder integration in 2018, but the extent of its integration is unknown. **Objective:** To assess the integration level using Harden's Ladder of Integration of medical colleges in KPK and examine variations across institutions, faculty profiles, and demographic data. **Methods:** A cross-sectional study was conducted from October 2024 to February 2025 across 13 public and private medical colleges within KPK. Faculty members received a validated questionnaire based on Harden's Ladder, which was distributed through convenience sampling. The study employed Chi-square and Fisher's exact tests to investigate the relationship between faculty demographics and levels of integration. **Results:** 99 faculty members participated. All faculty members reported full implementation of Step 5, which represents temporal coordination, whereas Steps 7-11 showed implementation in ≤50% of colleges (7 colleges). Senior faculty members with >3 years of experience observed better integration levels. The statistical analysis revealed significant institutional differences ($p < 0.05$) that were evenly distributed across colleges. **Conclusions:** Temporal coordination (Step 5) is fully implemented, but advanced integration is inconsistent. Faculty/institutional factors significantly influence outcomes, potentially compromising WFME accreditation requirements for US residency eligibility. Targeted interventions are recommended to bridge this gap.

INTRODUCTION

Curriculum integration organizes education across disciplines into unified themes [1]. The World Federation of Medical Education (WFME) standards now require integrated teaching, as part of accreditation, necessary for graduates seeking US residency [2]. This policy was initially scheduled to be implemented by 2023 but was delayed until 2024 due to the COVID-19 pandemic [3]. Before 2018, KPK employed a traditional subject-based curriculum (separate preclinical sciences, followed by clinical years) that hindered linking basic science to clinical relevance. In 2018, KPK adopted Harden's Ladder to shift to an integrated curriculum, combining basic sciences with early clinical exposure through methods such as problem-based and team-based learning. This approach enhances

DOI: https://doi.org/10.54393/pjhs.v6i7.3089

clinical relevance, fosters critical thinking and problem-solving, and promotes active, engaging learning [4]. In a study of two cohorts of medical graduates from Utrecht Medical School, one cohort was taught a traditional curriculum and the other a vertically integrated curriculum. Graduates from an integrated curriculum made career decisions earlier and matched to residencies faster [5]. Similar results were obtained from a study in the Netherlands [6]. In a study conducted in South India to evaluate the effectiveness of an integrated curriculum based on student feedback, 56.7% of students regarded the integrated session as "very good," and 25.4% rated it as "excellent [7]. In a study conducted in Karachi, which evaluated the Integrated Learning Program (ILP) for undergraduate medical students, 78% of the students and 72% of faculty members expressed overall satisfaction with the program. Significant improvement in test performance was recorded [8]. In a study to evaluate challenges in a shift from a conventional to an integrated system in Pakistan, challenges in five dimensions were recognized by the authors: "Integrated Modular Curriculum (IMC) development, implementation, faculty transformation/change, institutional and regulatory body context [9]. Since KPK's integrated curriculum was rolled out from 2018-19 and extended to final-year students by 2023-24, its level of implementation has not been evaluated.

This study, therefore, aimed to assess curriculum integration (via Harden's Ladder) in KPK medical colleges and examine differences by institution, faculty background, and demographics.

METHODS

This cross-sectional study, employing a convenience sampling technique, was conducted in 13 public and private medical schools in Khyber Pakhtunkhwa, Pakistan, from 1 October 2024 to 25 February 2025. This study did not perform a formal sample size calculation because, study tried to include the entire population of eligible faculty members from medical colleges in KPK province. Since study attempted to include the whole population, and the final number was based on actual responses, a separate sample size formula was not applicable. This approach was supported by research methodology literature, which stated that when the full population was surveyed (census), sample size estimation was not required. As stated in the following study on PubMed about sample size requirements [10]. Inclusion was limited to faculty with Certificate in Health Professions Education (CHPE) or Master of Health Professions Education (MHPE) qualifications to ensure that participants had a formal understanding of educational principles and could provide informed responses on curriculum integration. IRB approval was obtained before data collection (IRB #129/GJMS/JC), and informed consent was implied through voluntary participation. A study was conducted with a structured questionnaire based on Harden's 11-step Integration Ladder, which has been validated in previous work [11, 12]. The questionnaire had 11 questions with binary (YES/NO) responses (one question corresponded to each step). Recognizing that asking a busy curriculum leads to distinguishing among five subtly different levels of agreement could lead to confusion, especially around unlabeled mid-scale options like "neutral," we obtained the original author's written permission to simplify each item into a binary Yes/No question. Specifically, responses of "agree" or "strongly agree" (4–5 on the original scale) were re-coded as YES (Present), while all lower ratings (1–3) became NO (Absent). No composite integration score was calculated; rather, each of the 11 steps was analyzed separately to reflect the presence of that integration step. Two medical education specialists reviewed the adapted instrument to ensure that each Yes/No item accurately reflected its intended integration domain, and their expert appraisal confirmed its content alignment. This dichotomous format had three clear advantages: it reduced respondent fatigue by eliminating finer grading, it removed ambiguity about what degree of agreement constitutes meaningful integration, and this binary approach focused analysis on whether each step of the Ladder was adopted, rather than on finer gradations of implementation. Questionnaires were distributed by medical students to 230 faculty members during routine academic activities, with students acting solely as neutral facilitators. As they held no evaluative authority, the risk of response bias was minimal. To ensure data quality, 61 responses were excluded due to incompleteness or lack of CHPE/MHPE qualification. Data obtained from participants were screened based on the inclusion criteria. 61 out of the total 160 responses (38.1%) were purposefully excluded due to incompleteness or lack of CHPE/MHPE qualifications to ensure participant competency and data validity in evaluating Harden's model. The final sample (n=99) retained broad institutional coverage (13 colleges) and adequate power for statistical detection of key associations. Data were entered in Microsoft Excel version 2024 and analyzed using SPSS version 23.0. The association of categorical variables and response to the levels of 11 steps of Harden's ladder of integration was determined using the chi-square test and Fisher's exact test (where applicable). Harden described eleven levels of integration, from isolated teaching to full, student-driven integration. These levels are briefly described as: **Isolation:** Departments teach entirely independently, with no coordination or reference to other subjects, students must create links themselves. **Awareness:** Teachers are informed about what colleagues

DOI: https://doi.org/10.54393/pjhs.v6i7.3089

cover in other departments (via shared objectives or handouts), but no explicit effort is made to integrate content for learners. Harmonization: Teachers consult one another when planning, so related topics combine rather than duplicate, yet each subject still stands alone. **Nesting:** A subjectbased course "infuses" a few objectives or topics drawn from other disciplines to enrich its teaching. Temporal Coordination: Related topics across disciplines are scheduled at the same time, although taught separately but in parallel to highlight connections. **Sharing:** Two (or more) disciplines jointly design and deliver sessions around overlapping concepts, treating them as ends in themselves. **Correlation:** Within a primarily subject-based curriculum, standalone integrated sessions bring together common themes from multiple subjects. **Complementary:** Integrated sessions become more frequent and structured, weaving themes through subject teaching rather than remaining occasional add-ons. **Multidisciplinary:** Multiple disciplines contribute to a single, theme-based course, each retains its identity but works toward a common focus. **Interdisciplinary:** Subject boundaries blur: content from various fields combines into a new, unified course without obvious discipline labels. **Transdisciplinary:** All discipline distinctions dissolve. Learning revolves around real-world problems or themes, and students themselves drive integration.

RESULTS

Ninety-nine faculty (53.5% male, 46.5% female) participated, primarily lecturers (49.5%) and mostly with >3 years' experience (80.8%). All faculty reported full implementation of Step 5 (temporal coordination), indicating synchronized scheduling across disciplines. Agreement declined markedly at higher steps: only ~35–50% of faculty reported Steps 6-9, and ~23–25% reported Steps 10–11. This trend indicates robust horizontal integration but weak multidisciplinary/interdisciplinary integration (Table 1).

Table 1: Demographics and Frequency of Faculty Agreement for Each Step of Integration

Steps of Integration	Overall Responses (n=99)	Gender		Experience		Designation			
		Male (n=46)	Female (n=53)	<3 Years (n=19)	>3 Years (n=80)	Lecturer (n=49)	Assistant Professor (n=20)	Associate Professor (n=14)	Professor (n=16)
Step 1	0	0	0	0	0	0	0	0	0
Step 2	48	24	24	10	38	25	7	11	5
Step 3	81	39	42	13	68	43	15	10	13
Step 4	78	38	40	13	65	38	15	12	13
Step 5	98	45	53	19	79	48	20	14	16
Step 6	35	12	23	8	27	13	10	3	9
Step 7	47	27	20	5	42	25	12	3	7
Step 8	50	29	21	6	44	25	13	4	8
Step 9	50	25	25	8	42	23	11	6	10
Step 10	23	10	13	7	16	8	3	8	4
Step 11	25	13	12	4	21	10	4	4	7

Note: This table displayed Demographics total frequencies and subgroup responses across gender, experience, and designation. Step 5 (Temporal Coordination) was universally agreed upon, whereas Steps 7-11 showed lower levels of faculty agreement, indicating weaker interdisciplinary implementation.

Some colleges (e.g., BKMC, KMC, NWSM, SMC, KBMC) showed relatively higher integration, while others (NMC, GMC, BMC, STMC) were lower. No single institution disproportionately drove these results (Table 2).

Table 2: Faculty-Reported Implementation of Integration Steps across Medical Colleges

Steps of Integration	BKMC (n=8)	BMC (n=6)	GMC (n=8)	KbMC (n=5)	KGMC (n=4)	KIMS (n=1)	KMC (n=16)	NMC (n=3)	NWSM (n=24)	PMC (n=7)	SMC (n=13)	STMC (n=2)	WMC (n=2)
Step 1	0	0	0	0	0	0	0	0	0	0	0	0	0
Step 2	4	5	8	1	0	1	7	3	7	2	7	1	2
Step 3	7	4	8	5	4	0	13	3	22	5	6	2	2
Step 4	7	4	8	5	4	0	11	2	20	6	8	1	2
Step 5	8	6	8	5	4	1	16	3	24	7	12	2	2
Step 6	4	0	0	1	3	0	5	0	11	4	6	0	1
Step 7	4	0	0	5	3	0	11	0	17	5	1	1	0
Step 8	5	0	0	5	3	0	9	0	20	5	2	1	0
Step 9	4	0	0	2	1	1	9	3	14	6	10	0	0
Step 10	3	0	0	1	0	0	4	2	4	1	8	0	0
Step 11	3	0	0	0	0	0	6	1	5	4	6	0	0

DOI: https://doi.org/10.54393/pjhs.v6i7.3089

Note: This table shows the number of faculty members from each institution who reported implementation ("Yes") of the corresponding Step of integration according to Harden's Ladder (Steps 1–11). Step 5 (Temporal Coordination) showed universal agreement, whereas higher steps (7–11) revealed considerable variation between institutions. Bacha Khan Medical College (BKMC), Bannu Medical College (BMC), Gomal Medical College (GMC), Kabir Medical College (KbMC), Khyber Girls Medical College (KGMC), KMU Institute of Medical Sciences (KIMS), Khyber Medical College (KMC), Nowshera Medical College (NMC), Northwest School of Medicine (NWSM), Peshawar Medical College (PMC), Saidu Medical College (SMC), Swat Medical College (STMC), Women Medical College (WMC).

Experience influenced responses: faculty with >3 years' experience reported higher adoption of advanced steps (e.g., 52.5% vs. 42.1% at Step 9). Only Step 7 (correlation) differed significantly by experience (χ^2=4.221, p=0.045) (Tables 1 and 3). Institutional variation was significant for several steps (2, 3, 7–11; all p<0.05). Designation also played a role: senior faculty (associate/full professors) endorsed more advanced integration. Steps 2 and 10 were significantly associated with academic rank (p<0.05), with associate professors particularly favoring interdisciplinary integration (Step 10) (Tables 1 and 3). Gender differences were minor: males reported higher agreement at Steps 7–8 (χ^2 for Step 7 = 4.339, p=0.045), whereas all female faculty reported Step 5. No significant gender differences were found for other steps (Tables 3).

Table 3: Summary of Chi-Square Test Results across Integration Steps by Faculty Demographics and Institutional Affiliation

Steps of Integration	Experience χ^2 / p	Gender χ^2 / p	Designation χ^2 / p	Institution χ^2 / p
1	0.240 / 1.000	1.164 / 0.465	1.031 / 1.000	11.491 / 0.465
2	0.162 / 0.800	0.468 / 0.549	8.559 / **0.036***	28.181 / **0.001***
3	2.837 / 0.092	0.508 / 0.603	2.805 / 0.361	24.124 / **0.037***
4	1.512 / 0.226	0.751 / 0.464	0.676 / 0.935	14.753 / 0.264
5	0.240 / 1.000	1.164 / 0.465	1.031 / 1.000	6.683 / 0.596
6	0.469 / 0.595	3.228 / 0.093	7.791 / 0.052	18.532 / 0.068
7	4.221 / **0.045***	4.339 / **0.045***	5.403 / 0.139	42.867 / **0.000***
8	3.369 / 0.078	5.404 / **0.027***	4.382 / 0.236	44.928 / **0.000***
9	0.664 / 0.454	0.508 / 0.547	1.659 / 0.650	31.450 / **0.000***
10	2.442 / 0.137	0.107 / 0.814	11.125 / **0.019***	22.694 / **0.039***
11	0.220 / 0.774	0.412 / 0.644	3.884 / 0.281	18.499 / **0.039***

Note: This table combines results from four separate cross-tabulation analyses to reduce visual clutter and enable direct comparison. Complete raw counts are available upon request.

DISCUSSION

This study found that temporal coordination (Step 5) is fully implemented across KPK medical schools, whereas higher integration levels (Steps 7–11) are inconsistent. Senior and higher-ranked faculty reported greater integration, implying they may be more involved in curriculum planning or have received relevant training. Junior faculty respondents reported lower agreement with higher integration, possibly due to limited involvement in curriculum design or access to training programs. This finding necessitates targeted training initiatives for junior faculty to bridge this gap. Institutional variation was significant, but not attributable to a single institution. Institutional variation was widespread, suggesting systemic challenges (policy gaps, interdepartmental collaboration) that likely affect implementation [13-15]. Our results align with previous findings: other studies have reported minimal isolation (Step 1) and dominant temporal coordination (Step 5) in Pakistani curricula [12]. The findings of this study align with those of this study. However, this study expands on this by analyzing faculty perceptions based on institution, experience, and gender, providing a more comprehensive evaluation of integration disparities across medical colleges in Khyber Pakhtunkhwa (KPK). The dominance of temporal coordination (Step 5) over advanced integration (Steps 7-11) in KPK mirrors. These findings align with the evolving landscape of medical education, where both faculty and students are adapting to innovative learning strategies. Recent insights from Pakistani faculty highlight a notable shift in teaching practices, emphasizing the need for active and student-centered approaches to improve engagement and learning outcomes [15]. Among these, Problem-Based Learning (PBL) has gained significant traction due to its demonstrated effectiveness in enhancing critical thinking, clinical reasoning, and knowledge retention. A scoping review by Trullàs *et al.*, further supported the integration of PBL methodologies in undergraduate curricula, noting substantial improvements in educational outcomes across diverse settings [16]. Faculty development remains a critical component in overcoming the challenges associated with teaching in medical education. Shrivastava *et al.*, emphasized that faculty often face multiple instructional barriers, including lack of training in modern pedagogical approaches and limited confidence in implementing innovative methods. Their mixed-methods study demonstrates that medical education workshops play a significant role in enhancing teaching competencies, fostering a deeper understanding of effective educational strategies, and encouraging reflective teaching practices [17]. Curriculum integration is widely recognized as a cornerstone of modern medical education, aiming to create cohesive learning experiences that bridge basic and clinical sciences. Malik and Malik provide practical guidance for educators seeking to develop integrated curricula, emphasizing the importance of alignment, collaboration, and contextual relevance [18]. Further supporting this approach, Husain *et al.* highlighted how integration enhances learner engagement and facilitates

DOI: https://doi.org/10.54393/pjhs.v6i7.3089

better retention by reducing compartmentalized learning. However, the process is not without its challenges [19]. Achike underscored the complexities faced by institutions implementing integrated curricula, such as resistance to change, resource limitations, and the need for faculty development [20]. International studies from the Netherlands and South India regarding the integrated system report that students identify this system as enhancing engagement, critical thinking, and problem-solving [5-7]. However, these studies differed from this study in that they focused on students' perspectives, while this study reported faculty perspectives. Both emphasize gradual implementation (e.g., phased modules) and shared challenges: faculty resistance, resource constraints, and preserving disciplinary identity. Francis I. Achike described some of the challenges of integration in the modern medical curriculum, along with recommendations for each challenge [20]. Asad and Khaliq affirmed integration improves clinical reasoning but identified resource gaps and faculty resistance as critical barriers. This aligns with KPK's inconsistent advanced integration [21]. A strength of this study is the use of Harden's Ladder, a validated global framework, and the broad inclusion of KPK institutions. To our knowledge, it is the first assessment of curriculum integration in KPK following modular implementation. Limitations include reliance on self-reported data without triangulation through curriculum documents or direct observation, which may affect objectivity, and the use of convenience sampling. Future research should include curricular audits, student feedback, and qualitative interviews to explore barriers and strategies for improvement.

CONCLUSIONS

While temporal coordination (Step 5) is universal, higher integration (Steps 7-11) remains inconsistent, influenced by faculty experience, designation, and institutional factors. Critically, this gap may impede compliance with WFME accreditation standards, mandatory for graduates seeking US residencies, which require robust vertical-horizontal integration. Province-wide policy reforms, faculty development, and institutional support are urgently needed to meet these global benchmarks.

ACKNOWLEDGEMENTS

We thank Dr. Naila Baig for permission to use the questionnaire and Drs. Samina Qadir and Fazal Ur Rehman for their guidance throughout the study.

Authors Contribution

Conceptualization: FA[1], QMYA, JN
Methodology: FA[1], QMYA, JZ, FA[2], RR, AI, FI
Formal analysis: FA[1], QMYA, JN, RR
Writing, review and editing: QMYA, LZ, FA[2], RR, OS, AI, FI

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Shoemaker BJ. Integrative education: A curriculum for the twenty-first century. OSSC Bulletin. 1989 Oct; 33(2): n2.

[2] World Federation for Medical Education (WFME). Basic medical education: WFME global standards for quality improvement [Internet]. 2020 [cited: 23rd Feb 2025]. p. 11,15. Available from: https://wfme.org/wp-content/uploads/2022/03/WFME-BME-Standards-2020.pdf.

[3] Quintero GA, Vergel J, Arredondo M, Ariza MC, Gómez P, Pinzon-Barrios AM. Integrated medical curriculum: advantages and disadvantages. Journal of Medical Education and Curricular Development. 2016 Jan; 3: JMECD-S18920. doi: 10.4137/JMECD.S18920.

[4] Wijnen-Meijer M, Ten Cate OT, Rademakers JJ, Van Der Schaaf M, Borleffs JC. The influence of a vertically integrated curriculum on the transition to postgraduate training. Medical Teacher. 2009 Jan; 31(11): e528-32. doi: 10.3109/01421590902842417.

[5] Wijnen-Meijer M, Ten Cate OT, Van Der Schaaf M, Borleffs JC. Vertical integration in medical school: effect on the transition to postgraduate training. Medical Education. 2010 Mar; 44(3): 272-9. doi: 10.1111/j.1365-2923.2009.03571.x.

[6] Muthukumar T, Konduru RK, Manikandan M, Asir J, Iqbal N, Bazroy J *et al.* Scope of integrated teaching in a medical college: A study from South India. Journal of Medical Society. 2017 May; 31(2): 127-30. doi: 10.4103/jms.jms_98_16.

[7] Rehman R, Iqbal A, Syed S, Kamran A. Evaluation of integrated learning program of undergraduate medical students. Pakistan Journal of Physiology. 2011; 7(2): 37-41.

[8] Aziz S, Wajid G, Khan RA, Zaidi FZ. Dimensions of challenges in transformation from traditional to integrated modular curriculum-Experiences from Pakistan. Pakistan Journal of Medical Sciences. 2023 Nov; 39(6): 1730. doi: 10.12669/pjms.39.6.6730.

[9] Harden RM. The integration ladder: a tool for curriculum planning and evaluation. Medical Education-Oxford-. 2000 Jul; 34(7): 551-7. doi: 10.1046/j.1365-2923.2000.00697.x.
[10] Nayak BK. Understanding the Relevance of Sample Size Calculation. Indian journal of ophthalmology. 2010Nov;58(6):469-70.doi: 10.4103/0301-4738.71673.
[11] Baig N, Siddiqui F, Baig MA, Khursheed I, Meah KM. Level of integration in current undergraduate curricula of two private-sector medical colleges in Karachi. Canadian Medical Education Journal. 2022 Jul; 13(3): 84-90. doi: 10.36834/cmej.73910.
[12] Cheema KM. Faculty perspective about difficulties in implementation of newly introduced integrated curriculum for basic sciences in king edward medical university. Pakistan Armed Forces Medical Journal. 2021 Jun; 30(3): 1078. doi: 10.51253/pafmj.v71i3.3521.
[13] Burney AA, Burney IA, Dherwani K. Integrated Curriculum in Medical Schools in Pakistan-What? Why? When? and How Much. Annals of King Edward Medical University. 2024 Dec; 30(4): 433-9. doi: 10.21649/akemu.v30i4.5618.
[14] Arshad M, Mahmood S, Abid M, Baloch MF, Mansoor M, Butt ZP. Perception of Medical Students and Faculty Regarding Integrated Curriculum in A Medical Institute. 2025 Mar. doi: 10.51273/esc25.251321131.
[15] Shah T, Zehra T, Irshad Z, Sultan BA, Afshan G, Wahid Y. Switching Trends in Medical Education: Faculty Perception. Pakistan Armed Forces Medical Journal. 2024 Oct; 74(5): 1392. doi: 10.51253/pafmj.v74i5.9123.
[16] Trullàs JC, Blay C, Sarri E, Pujol R. Effectiveness of problem-based learning methodology in undergraduate medical education: a scoping review. BioMed Central Medical Education. 2022 Feb; 22(1): 104. doi: 10.1186/s12909-022-03154-8.
[17] Shrivastava S, Manivasakan S, Shrivastava PS, Somu L. Perception of faculty toward challenges in teaching and the role of medical education workshops in addressing them: a mixed-methods study. Avicenna Journal of Medicine. 2022 Jan; 12(01): 021-30. doi: 10.1055/s-0042-1744434.
[18] Malik AS and Malik RH. Twelve tips for developing an integrated curriculum. Medical teacher. 2011 Feb; 33(2): 99-104. doi: 10.3109/0142159X.2010.507711.
[19] Husain M, Khan S, Badyal D. Integration in medical education. Indian Pediatrics. 2020 Sep; 57(9): 842-7. doi: 10.1007/s13312-020-1964-x.
[20] Achike FI. The challenges of integration in an innovative modern medical curriculum. Medical Science Educator. 2016 Mar; 26(1): 153-8. doi: 10.1007/s40670-015-0206-7.
[21] Asad M and Khaliq T. Faculty perception regarding integrated curriculum at undergraduate level: a qualitative study. Pakistan Armed Forces Medical Journal. 2020 Feb; 29(1): 217.