



Medical Graduates' Perception on the Quality of Clinical Education

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ABSTRACT

Introduction: Clinical educators around the globe agreed that an optimal educational climate is a vital aspect for effective learning to take place. This study was conducted to evaluate the perceptions of graduates toward the quality of clinical education climate in USM medical school. **Methods:** A cross-sectional study was conducted on a cohort of USM medical graduates. Questionnaires were administered to the graduates to measure their perception on four aspects of clinical education climate that include structure of clinical rotation, clinical teaching and learning activities, quality of lecturers and end-clinical rotation assessment across 13 clinical rotations. The graduates were requested to respond to seven-Likert scale ranging from 1 (poor) to 7 (excellent). Scores of equal to or more than 5 was considered as positive areas, scores of between 4 and 5 were considered as areas for improvement, and scores less than 4 were considered as areas of concern. Data analysis was performed using SPSS version 20. **Results:** A total of 105 (96.3%) graduates responded to the questionnaire. Results showed only the paediatric rotation obtained positive ratings on all areas of the clinical rotation structure. With regards to teaching and learning activities, the graduates scored most of the clinical rotations between 4 and 5. With regards to the quality of lecturers, most of the clinical rotations obtained score more than 5. Most of the areas related to the end-of-assessment of clinical rotation obtained score more than 5 except for the feedback adequacy, indicating inadequacy of feedback they received. **Conclusion:** USM medical graduates positively perceived the quality of lecturers during clinical training, however several areas of clinical education related to clinical rotation structure, clinical teaching and learning activities, and feedback practice were perceived by them as areas for improvement. Medical schools should introduce strategic measures to address the concerns raised by the graduates to ensure the best clinical learning experience are provided to the current and future medical students.

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Introduction

Founded in 1979, School of Medical Sciences Universiti Sains Malaysia (SMS-USM) is the third medical school in Malaysia and since its inception, it provides a 5-year SPICES medical education program (1-6). This program is

divided into three phases – pre-clinical (Phase I), para-clinical (Phase II) and clinical (Phase III). Phase I (Year 1) is the fundamental year focusing on basic sciences subjects through the organ-based systems. Phase II (Year 2 and 3) is the para-clinical phase, which is a transitional phase to clinical years that continues the system-

based approach and introduces the basics of clinical clerkship. The major learning method during the Phase II is problem-based learning (PBL). Phase III (Year 4 and 5) is the clinical phase whereby the students are rotated through all the clinical disciplines – full clinical year starts during the fourth and fifth year. A total of 13 clinical rotations are included during these 2 years, which are obstetrics and gynaecology, surgery, orthopaedic, ophthalmology, otorhinolaryngology (ORL), psychiatry, paediatric, medicine, family medicine, district, neuroscience, accident and emergency, and anaesthesiology. The medical students must go through all clinical rotations in small groups; each posting has its own objectives, teaching schedules, teaching and learning activities, and end-of-clinical rotation assessments, which being handled by clinical rotation coordinators. Duration of the postings are varied from each other.

Clinical educators around the globe agreed that an optimal educational climate is a vital aspect for effective learning to take place (7-11). Likewise, a favourable educational climate has favourable impacts on students' professional development, academic completion and personal well-being (10-14). Without a doubt, appraisal of the educational climate has been emphasized as a key to the delivery of high quality medical education (7-11). For the last 15 years, literature showed that the global score of educational environment (i.e., based on DREEM) across medical schools ranged between 89 and 143 out of 200 (6) – UK, Canada, Australia, Malaysia, Turkey, Nepal, India, Nigeria, Saudi Arabia, Chile, Sri Lanka, Trinidad and Yemen. Specifically, the global score at the clinical phase across medical schools ranged between 86.4 and 143 (15-24). Likewise, the global score at the pre-clinical phase across institutions ranged between 96.5 and 130 (15-18, 20). In addition, the global score at the para-clinical phase (i.e., the transitional phase to clinical years whereby the basic sciences and clinical clerkship subjects are integrated) at two medical schools in Sri Lanka and Malaysia ranged between 109.7 and 117.9 (14, 20). Although variation of the reported findings between medical schools and

phases of medical training, these facts demonstrate the significance of clinical education quality appraisal to ensure the best clinical learning experiences provided to the future doctors (25).

From that notion, this study was conducted to evaluate the perceptions of graduates toward the quality of clinical education climate in USM medical school. This study was designed to answer 5 questions which include 1) What is the clinical education climate in the medical school? 2) What is the quality of clinical education at different clinical rotations? 3) What are the common areas of concern during clinical rotations? 4) What are the specific areas of concern at each clinical rotation? 5) What are the recommendations that could be derived from these results? It is hoped that this study will provide useful information to improve the clinical education climate.

Method

A cross-sectional study was conducted in May 2009 at the School of Medical Sciences, Universiti Sains Malaysia. The study population was the newly graduated medical students. Data was collected using a validated questionnaire. The questionnaire was about the graduates' perception on the quality of clinical education encompass of four aspects: 1) structure of clinical rotation, 2) clinical teaching and learning activities, 3) quality of lecturers in clinical rotations, and 4) end-of-assessment of clinical rotations across 13 clinical rotations which were obstetrics and gynaecology (O & G), surgery, orthopaedic, ophthalmology, ORL, psychiatry, paediatric, medicine, family medicine, district, neuroscience, accident and emergency (A & E) and anaesthesiology. The structure of clinical rotation was evaluated based on the clarity of learning objectives, clarity of skill objectives, teaching schedule, implementation of posting and duration of posting. The clinical teaching and learning activities were evaluated based on bedside teaching, clinic session, ward work, usage of clinical skills center, Operation Theatre (OT), labour room, oncall, posting at HRPZ II, and mentoring and supervision. The quality of

lecturers in clinical rotations was evaluated based on clinical teaching skills, lecturing skills, approachability, role model, and supervision skills. The end-of-assessment of clinical rotations was evaluated based on clarity of passing requirements, fairness of assessment methods, implementation of assessment, thoroughness of assessment, and adequacy of feedback. The graduates were requested to

respond to seven-Likert scale ranging from 1(poor) to 7(excellent). Any scores equal to or more than 5 were considered as positive areas, between 4 and 5 were considered as areas for improvement, and less than 4 were considered as areas of concern. Data analysis was performed using SPSS version 20. Mean and standard deviation were analysed and reported to reflect the graduates' perception on each aspect

Table 1: Graduates' perception on the structure of clinical rotations

Clinical rotation	Clarity of learning objectives	Clarity of skill objectives	Teaching schedule	Implementation of posting	Duration
O & G	4.93 (1.12)	4.75 (1.12)	4.86 (1.00)	4.98 (0.92)	4.97 (0.95)
Surgery	4.50 (1.20)	4.40 (1.16)	4.48 (1.08)	4.64 (1.10)	4.80 (1.03)
Orthopaedic	4.92 (1.04)	4.75 (0.99)	4.83 (1.07)	4.92 (0.93)	4.62 (1.24)
Ophthalmology	4.97 (0.95)	4.85 (0.97)	4.97 (0.98)	5.03 (0.85)	4.39 (1.25)
ORL	4.85 (0.96)	4.75 (0.98)	4.87 (0.94)	4.90 (0.90)	4.39 (1.26)
Psychiatry	4.92 (1.15)	4.72 (1.03)	4.87 (1.04)	4.88 (1.03)	4.65 (1.22)
Paediatric	5.32 (0.91)	5.16 (0.88)	5.31 (0.93)	5.31 (0.85)	5.19 (1.00)
Medicine	5.07 (1.00)	4.98 (0.82)	5.05 (0.93)	5.08 (0.91)	4.92 (1.10)
Family Medicine	4.90 (1.04)	4.82 (0.99)	4.75 (1.06)	4.91 (1.04)	4.78 (1.18)
District	4.77 (1.09)	4.70 (0.97)	4.61 (1.05)	4.79 (0.98)	4.71 (1.14)
Neurosciences	4.49 (1.15)	4.38 (1.05)	4.47 (1.05)	4.61 (1.07)	4.27 (1.27)
A & E	5.22 (0.98)	5.07 (0.95)	5.04 (0.93)	5.18 (0.87)	4.43 (1.29)
Anaesthesiology	4.91 (0.97)	4.71 (1.09)	4.80 (1.02)	4.88 (1.07)	4.52 (1.22)

Scores equal to or more than 5 was considered as positive areas; Scores between 4 and 5 were considered as areas for improvement; Scores less than 4 was considered as areas of concern. Data were presented in mean (standard deviation).

Table 2: Graduates' perception on teaching and learning activities during clinical rotations

Clinical rotation	Bedside teaching	Clinic session	Ward work	Usage of clinical skills center	OT	Labour Room	Oncall	HRPZ II	Mentoring and supervision
O & G	4.96 (1.17)	4.36 (1.20)	4.84 (1.04)	4.67 (1.20)	4.47 (1.15)	5.47 (1.07)	5.36 (1.09)	-	5.03 (1.25)
Surgery	4.54 (1.30)	4.56 (1.20)	4.46 (1.30)	4.38 (1.19)	4.43 (1.32)	-	4.15 (1.31)	5.57 (1.00)	4.37 (1.36)
Orthopaedic	5.00 (0.97)	5.04 (0.98)	4.93 (1.00)	4.33 (1.18)	4.48 (1.20)	-	5.04 (1.03)	-	5.07 (1.18)
Ophthalmology	4.47 (1.17)	4.99 (1.25)	4.36 (1.26)	4.14 (1.45)	4.47 (1.19)	-	4.40 (1.35)	-	4.91 (1.16)
ORL	4.46 (1.16)	4.81 (1.21)	4.23 (1.20)	4.13 (1.42)	4.21 (1.33)	-	4.25 (1.32)	-	4.69 (1.30)
Psychiatry	4.84 (1.03)	4.70 (1.06)	4.43 (1.09)	4.22 (1.46)	-	-	4.10 (1.39)	5.20 (0.88)	4.95 (1.06)
Paediatric	5.49 (0.91)	5.09 (1.10)	5.25 (1.01)	4.68 (1.20)	-	-	5.26 (1.01)	5.15 (1.29)	5.30 (1.00)
Medicine	5.39 (0.91)	4.93 (1.04)	5.10 (1.02)	4.52 (1.25)	-	-	5.13 (1.06)	-	5.03 (1.01)
Family Medicine	4.56 (1.09)	4.62 (1.13)	4.62 (1.05)	4.48 (1.10)	-	-	4.88 (1.07)	-	4.83 (1.05)
District	4.43 (1.07)	4.54 (1.08)	4.67 (1.00)	4.37 (1.16)	-	-	4.89 (1.08)	-	4.83 (1.03)
Neurosciences	4.29 (1.17)	4.27 (1.06)	4.25 (1.10)	4.22 (1.26)	3.97 (1.37)	-	4.23 (1.32)	-	4.45 (1.23)
A & E	5.03 (1.12)	4.91 (0.99)	5.04 (1.05)	4.67 (1.19)	-	-	5.59 (1.06)	-	5.14 (1.03)
Anaesthesiology	4.52 (1.11)	4.56 (1.08)	4.70 (1.14)	4.58 (1.27)	4.88 (1.28)	-	4.71 (1.19)	-	4.79 (1.09)

Scores equal to or more than 5 was considered as positive areas; Scores between 4 and 5 were considered as areas for improvement; Scores less than 4 was considered as areas of concern. Data were presented in mean (standard deviation).

Result

A total of 105 (96.3%) graduates responded to the questionnaire. 74 (70.5%) respondents were females and 31 (29.5%) were males with 82 Malays (78.8%), 21 Chinese (20.2%), and 1 Indian (1%). A total of 85 (82.5%) graduates were qualified from matriculation program while 18 (17.5%) were qualified from STPM.

Table 1 shows that only paediatric rotation obtained positive rating on all areas of the clinical rotation structure and none of the clinical rotation obtained score less than 4 (i.e. area of concern). A&E rotation received positive ratings on all aspects except for its duration that is perceived as areas for improvement. Medicine was perceived as areas for improvement with regard to clarity of skill objectives and duration of posting. Ophthalmology obtained only one positive area which is the implementation of posting, others were perceived as areas for improvement. Apart from that, all areas of the clinical rotation structure in O & G, surgery, orthopaedic, ORL, psychiatry, family medicine, district, neuroscience, and anaesthesiology were perceived as areas for improvement.

In general, graduates perceived there are rooms for improvements with regards to teaching and learning activities (Table 2). The graduates perceived neuroscience OT session as an area of

concern. Surgery and psychiatry achieved one positive area which is the HRPZ II posting, whereas other areas are areas for improvement. Most of the postings need improvement during their clinic session, except for orthopaedic and paediatric. On the other aspect, the graduates perceived positively HRPZ II posting and labour room placement. Overall, the graduates perceived that the usage of clinical skills center was suboptimal, therefore need to be optimised. Most of the clinical rotations need to improve on bedside teaching and ward work, except for orthopaedic, paediatric, medicine, and A & E. For clinic session, only orthopaedic and paediatric rotations were perceived as positive areas. Besides that, mentoring and supervision need to be improved as only 5 out of 13 rotations received positive ratings from the graduates which are O&G, orthopaedic, paediatric, medicine and A&E.

Overall, the graduates perceived positively about their lecturers with regards to clinical teaching skills, lecturing skills, approachability, role model and supervision skills (Table 3). Nevertheless, several clinical rotations lecturers were perceived less positive by the graduates in 1) surgery and neuroscience rotations in the areas of clinical teaching skills, approachability, and supervision skills and 2) family medicine and district rotations in supervision skills.

Table 3: Graduates' perception on quality of lecturers in clinical rotations

Clinical rotation	Clinical Teaching skills	Lecturing skills	Approachability	Role Model	Supervision skills
O & G	5.43 (1.06)	5.50 (1.08)	5.29 (1.27)	5.40 (1.12)	5.20 (1.17)
Surgery	4.99 (1.27)	5.07 (1.32)	4.85 (1.35)	5.00 (1.25)	4.65 (1.40)
Orthopaedic	5.35 (1.01)	5.41 (1.08)	5.30 (1.12)	5.39 (1.07)	5.24 (1.06)
Ophthalmology	5.29 (1.03)	5.44 (1.02)	5.25 (1.05)	5.31 (1.06)	5.19 (1.00)
ORL	5.25 (1.06)	5.35 (1.05)	5.20 (1.05)	5.24 (1.02)	5.11 (0.97)
Psychiatry	5.27 (1.00)	5.38 (1.05)	5.19 (1.13)	5.14 (1.06)	5.12 (1.07)
Paediatric	5.75 (0.85)	5.75 (0.92)	5.51 (0.93)	5.71 (0.97)	5.48 (0.96)
Medicine	5.59 (0.89)	5.58 (0.90)	5.25 (1.06)	5.48 (1.02)	5.21 (1.00)
Family Medicine	5.17 (1.09)	5.33 (1.10)	5.07 (1.15)	5.12 (1.06)	4.99 (1.13)
District	5.07 (1.14)	5.16 (1.17)	5.04 (1.21)	5.09 (1.09)	4.99 (1.08)
Neurosciences	4.92 (1.29)	5.00 (1.28)	4.70 (1.34)	5.12 (1.26)	4.70 (1.21)
A & E	5.46 (1.06)	5.56 (1.07)	5.54 (1.00)	5.53 (1.08)	5.30 (0.95)
Anaesthesiology	5.21 (1.09)	5.30 (1.12)	5.05 (1.14)	5.20 (1.14)	5.02 (1.05)

Scores equal to or more than 5 was considered as positive areas; Scores between 4 and 5 were considered as areas for improvement; Scores less than 4 was considered as areas of concern. Data were presented in mean (standard deviation).

The graduates perceived feedback adequacy is an area for improvement, suggesting that they did not receive adequate feedback for learning. On the other hand, graduates were clearly briefed about the requirements of clinical rotations. The

results seem to indicate surgery and neuroscience rotations need to revisit their assessment practices – fairness, implementation, and thoroughness of assessment (Table 4).

Table 4: Graduates' perception on end-of-assessment of clinical rotations

Clinical rotation	Clarity of passing requirements	Fairness of assessment methods	Implementation of assessment	Thoroughness of assessment	Adequacy of feedback
O & G	5.27 (0.96)	5.07 (1.13)	5.14 (0.91)	5.12 (1.06)	4.91 (1.06)
Surgery	5.13 (1.26)	4.70 (1.43)	4.91 (1.19)	4.82 (1.34)	4.78 (1.32)
Orthopaedic	5.33 (1.11)	5.12 (1.16)	5.17 (1.09)	5.15 (1.15)	5.05 (1.07)
Ophthalmology	5.23 (1.01)	5.16 (1.02)	5.08 (1.00)	5.07 (0.95)	4.93 (0.95)
ORL	5.16 (1.01)	5.07 (1.02)	5.05 (0.95)	5.00 (0.94)	4.90 (0.92)
Psychiatry	5.21 (1.04)	5.16 (1.03)	4.99 (0.99)	5.04 (0.95)	4.90 (0.94)
Paediatric	5.48 (0.94)	5.46 (0.99)	5.39 (0.89)	5.47 (0.96)	5.21 (0.97)
Medicine	5.32 (1.01)	5.14 (1.04)	5.21 (0.97)	5.19 (0.98)	5.00 (1.00)
Family Medicine	5.11 (1.03)	5.10 (1.01)	5.10 (1.02)	5.05 (1.00)	4.87 (0.99)
District	5.12 (1.03)	5.09 (1.03)	5.04 (1.05)	5.02 (1.02)	4.85 (1.03)
Neuroscience	5.12 (1.16)	4.91 (1.20)	4.91 (1.11)	4.80 (1.16)	4.76 (1.05)
A & E	5.38 (0.96)	5.25 (1.02)	5.24 (0.91)	5.19 (0.94)	5.01 (0.93)
Anaesthesiology	5.27 (1.05)	5.07 (1.05)	5.10 (0.99)	4.98 (1.08)	4.91 (1.00)

Scores equal to or more than 5 was considered as positive areas; Scores between 4 and 5 were considered as areas for improvement; Scores less than 4 was considered as areas of concern. Data were presented in mean (standard deviation).

In a nutshell, the major areas for improvement are related to the clinical rotation structure, the clinical teaching and learning activities, and the feedback practice.

Discussion

Interestingly, our findings demonstrated that the graduates positively perceived the quality of lecturers in clinical rotations and the components that were highly perceived by them are related to the clinical teacher characteristics – lecturing skills, approachability of the lecturers, role model, supervisory skills and clinical teaching skills. Similar finding was reported by Paukert et al, whereby the graduates of Baylor College of Medicine perceived the most which influence their favourable of their faculty was the teachers' characteristic (26). Similarly, the medical students, interns and residents graduating from Faculty of Medicine and Health Sciences (FMHS), UAE University perceived that three most important characteristics in their role model are personality, teaching and clinical skills (27). It is worth noting that, under proper guidance of skillful teachers, the learning experience of

medical students will be further enriched and enhanced (28). Conversely, the graduates illuminated several aspects of the clinical education which the faculty needs to address in order to improve the clinical learning experience, these include aspects related to the clinical rotation structure, the clinical teaching and learning activities, and the feedback practice during clinical rotations – each of these areas were discussed in the subsequent sections.

Concerning the structure of clinical rotation, it is interesting to highlight that the paediatric rotation consistently received positive rating from the graduates. On further exploration, based on our observation and literature review, we postulate several factors that might contribute to the positive perception, these include 1) the learning outcomes of the paediatric rotation were clearly stated, 2) the teaching timetable was highly organised, 3) the planned schedule was timely implemented, and 4) an apprenticeship system has been employed for training during the paediatric rotation (28). Obviously, based on the outcome-based education perspective, clearly defined learning outcomes will lead to good

constructive alignment between the learning outcomes, the teaching and learning activities, and the assessment of learning (29). It has been known that a well structured clinical rotation can effectively improve the students' knowledge (30). All these contribute to positive learning experience and climate, thus will positively contribute to learners' well-being (25). On that account, we recommend similar clinical rotation system should be introduced across clinical rotations during clinical training in USM.

Clinical educators agreed that the clinical teaching and learning activities are the integral elements for the success of any medical training particularly during the clinical phase (28). A qualitative study assessed medical graduates of 16 medical schools in USA found that the graduates suggested more space needed for the students and patients bond, more ambulatory care experience needed, and more interaction between the physicians and the medical students (31). These findings might explain the reasons of USM medical graduates perceived that several aspects of teaching and learning activities need to be improved for better learning experience during clinical rotations such as optimizing the usage of clinical skills center, realigning the teaching approaches at bedside, clinic and operation theatre, and designing purposeful ward works. It is worth to highlight that while there are certainly many excellent teachers in the Malaysian education system, a 2011 research by Ministry of Higher Education found that only 50% of lessons are being delivered in an effective manner (32). Therefore, information found in this study should form a basis for the medical school to relook on the clinical teaching and learning activities so that the declared curriculum could be delivered to the medical students effectively.

Feedback is widely recognised as an imperative tool for enhancing performance and practice. It allows the students to identify the area of deficiency for remedy and its positive impact to students has long been recognized (33). However it is the quality of feedback that determines its power and this quality is defined to a large extent by ways the recipients manage to engage with

the given feedback (34). Unfortunately, our study found that the graduate perceived inadequate feedback received from the clinical teachers across clinical rotations. Consequently, it could compromise the clinical learning experience gained by the graduates during the medical training. Our findings are consistent with other studies that claimed students tend to dissatisfy with and unfavourably perceive the feedback they received (35-37). We believe that medical school should introduce a serious effort to improve the current feedback practice to promote and facilitate the clinical learning experience during medical training. To do that, there are several common issues need to be addressed such as the timing of feedback, the effects of positive and negative feedback, the levels or types of feedback, the inter-relations between feedback and assessment, and the learner diversity (36, 38). In addition, two main factors need to be handled in creating a culture that values feedback. First, clinical teachers are extremely busy and their lack of time is a major obstacle – therefore, it is vital to reward and recognizes their dedication to a culture of feedback, and administrators must provide them with time to engage in and cultivate it (38, 39). Second, continuous faculty training programs are needed to ensure that the feedback process will optimize the learning process and augment the teaching quality (38, 39).

Based on the data obtained from this study and other investigations into the current challenges of undergraduate medical education in our medical school, USM medical school has embarked on a process of curriculum revision and renewal. The information reported in this paper represents only a small proportion of the information collected. In order to monitor and assess the quality of the undergraduate medical education, several steps have been taken to institutionalize this effort. To make it feasible and practical, perhaps, a web-based survey should replace this paper-based system. Longitudinal collection of data will enable the faculty to recognize curricular weaknesses, document results of corrective measures taken, and validate strengths (40).

Conclusion

USM medical graduates positively perceived the quality of lecturers during clinical training, however several areas of clinical education that are related to clinical rotation structure, clinical teaching and learning activities, and feedback practice were perceived by them as areas for improvement. Medical schools should introduce strategic measures to address the concerns raised by the graduates to ensure the best clinical learning experience to the future students. Equally for educators, future exploration of their appraisals is also imperative.

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Reference

1. Harden R, Sowden S, Dunn W. Educational strategies in curriculum development: the SPICES model. *Medical Education*. 1984;18(4):284-97.
2. Azila NMA, Zabidi-Hussin ZAMH, Jaafar R. Curricular trends in Malaysian medical schools: innovations within. *Ann Acad Med Singapore*. 2006;35:647-54.
3. Das M, Lanphear JH, Ja'afar R. Faculty evaluation of educational strategies in medical schools. *Medical Teacher*. 1994;16(4):355-61.
4. Majumder A, D'Souza U, Rahman S. Trends in medical education: challenges and directions for need-based reforms of medical training in South-East Asia. *Indian Journal of Medical Sciences*. 2004;58(9):369.
5. Zabidi H, Fuad A. Medical education in Universiti Sains Malaysia. *The Medical Journal of Malaysia*. 2002;57:8-12.
6. Yusoff MSB, Jaafar R, Arzuman H, Arifin WN, Mat Pa MN. Perceptions of medical students regarding educational climate at different phases of medical training in a Malaysian medical school. *Education in Medicine Journal*. 2013;5(3).
7. Dent JA, Harden RM. *A practical guide for medical teachers*. 3rd ed: Elsevier Churchill Livingstone; 2009.
8. Newble D, Cannon RA, Kapelis ZA. *A handbook for medical teachers*: Kluwer Academic Publishers; 2001.
9. Yusoff MSB. The Dundee Ready Educational Environment Measure: A Confirmatory Factor Analysis in a Sample of Malaysian Medical Students. *International Journal of Humanities and Social Science* 2012;2(16):313-21.
10. Genn J. AMEE Medical Education Guide No. 23 (Part 1): Curriculum, environment, climate, quality and change in medical education - a unifying perspective. *Medical Teacher*. 2001;23(4):337-44.
11. Genn J. AMEE Medical Education Guide No. 23 (Part 2): Curriculum, environment, climate, quality and change in medical education - a unifying perspective. *Medical Teacher*. 2001;23(5):445-54.
12. Audin K, Davy J, Barkham M. University Quality of Life and Learning (UNIQLL): An approach to student well-being, satisfaction and institutional change. *Journal of Further and Higher Education*. 2003;27(4):365-82.
13. Whittle S, Whelan B, Murdoch-Eaton D. DREEM and beyond; studies of the educational environment as a means for its enhancement. *Education for Health*. 2007;20(1):1-9.
14. Arzuman H, Yusoff MSB, Chit SP. Big Sib Students' Perceptions of the Educational Environment at the School of Medical Sciences, Universiti Sains Malaysia, using Dundee Ready Educational Environment Measure (DREEM) Inventory. *Malaysian Journal of Medical Sciences*. 2010;17(3):40-7.
15. Abraham R, Ramnarayan K, Vinod P, Torke S. Students' perceptions of learning environment in an Indian medical school. *BMC Medical Education*. 2008;8(1):1-5.
16. Al-Ayed I, Sheik S. Assessment of the educational environment at the College of Medicine of King Saud University, Riyadh. *East Mediterr Health J*. 2008;14(4):953-9.
17. Bassaw B, Roff S, McAleer S, Roopnarinesingh S, De Lisle J, Teelucksingh S, et al. Students' perspectives on the educational environment, Faculty of Medical Sciences, Trinidad. *Medical Teacher*. 2003;25(5):522-6.
18. Demirören M, Palaoglu Ö, Kemahli S, Özyurda F, Ayhan I. Perceptions of Students in Different Phases of Medical Education of Educational Environment: Ankara University Faculty of Medicine. *Medical education online*. 2008;13(8):1-8.
19. Denz-Penhey H, Murdoch JC. A comparison between findings from the DREEM questionnaire and that from qualitative interviews. *Medical Teacher*. 2009;31(10):449-53.

20. Jiffry M, McAleer S, Fernando S, Marasinghe R. Using the DREEM questionnaire to gather baseline information on an evolving medical school in Sri Lanka. *Medical Teacher*. 2005;27(4):348-52.
21. Lai N, Nalliah S, Jutti R, Hla Y, Lim V. The educational environment and self-perceived clinical competence of senior medical students in a Malaysian medical school. *Educ Health*. 2009;22(2):1-15.
22. Mayya S, Roff S. Students' perceptions of educational environment: a comparison of academic achievers and under-achievers at Kasturba Medical College, India. *Education for Health*. 2004;17(3):280-91.
23. Riquelme A, Oporto M, Oporto J, Mendez JI, Viviani P, Salech F, et al. Measuring students' perceptions of the educational climate of the new curriculum at the Pontificia Universidad Catolica de Chile: performance of the Spanish translation of the Dundee Ready Education Environment Measure (DREEM). *Education for Health*. 2009;22(1):112.
24. Roff S, McAleer S, Ifere O, Bhattacharya S. A global diagnostic tool for measuring educational environment: comparing Nigeria and Nepal. *Medical Teacher*. 2001;23(4):378-82.
25. Yusoff MSB, Arifin WN. Educational environment and psychological distress of medical students: the role of deep learning approach. *Journal of Taibah University Medical Sciences*. in press.
26. Paukert JL, Richards BF. How medical students and residents describe the roles and characteristics of their influential clinical teachers. *Academic Medicine*. 2000;75(8):843-5.
27. Elzubeir MA, Rizk DE. Identifying characteristics that students, interns and residents look for in their role models. *Medical Education*. 2001;35(3):272-7.
28. Taib F, Zin MRM, Ab Majid N, Yusoff MSB, Van Rostenberghe H. Apprenticeship teaching in paediatrics: students perspective for future improvement. *International Medical Journal*. 2013;20(1):1-3.
29. Spady WG. Organizing for results: The basis of authentic restructuring and reform. *Educational leadership*. 1988;46(2):4-8.
30. Sinclair HK, Cleland JA. Undergraduate medical students: who seeks formative feedback? *Medical education*. 2007;41(6):580-2.
31. McMurray JE, Schwartz MD, Genero NP, Linzer M. The attractiveness of internal medicine: a qualitative analysis of the experiences of female and male medical students. *Annals of internal medicine*. 1993;119(8):812-8.
32. Malaysia MoE. Malaysia Education Blueprint 2015-2025 (Higher Education). Kuala Lumpur: Ministry of Education Malaysia, 2015.
33. Chang N, Watson AB, Bakerson MA, Williams EE, McGoron FX, Spitzer B. Electronic feedback or handwritten feedback: What do undergraduate students prefer and why? *Journal of Teaching and Learning with Technology*. 2012;1(1):1-23.
34. Yusoff MSB, Hadie SNH, Rahim A, Fuad A. Adopting programmatic feedback to enhance the learning of complex skills. *Medical Education*. 2014;48(2):108-10.
35. Boehler ML, Rogers DA, Schwind CJ, Mayforth R, Quin J, Williams RG, et al. An investigation of medical student reactions to feedback: a randomised controlled trial. *Medical Education*. 2006;40(8):746-9.
36. Jothi N, Yusoff MSB. Knowledge and Perception of Medical Students on Feedback. *Education in Medicine Journal*. 2015;7(3):e44-55.
37. Krause K-L, Hartley R, James R, McInnis C. The first year experience in Australian universities: Findings from a decade of national studies: Centre for the Study of Higher Education, University of Melbourne Melbourne; 2005.
38. Yusoff MSB. Using feedback to enhance learning and teaching. Pulau Pinang: Centre for Academic Excellence & Student Advisory and Development, Universiti Sains Malaysia; 2013.
39. Norcini J. The power of feedback. *Medical Education*. 2010;44(1):16-7.
40. Jalili M, Mirzazadeh A, Azarpira A. A survey of medical students' perceptions of the quality of their medical education upon graduation. *Annals Academy of Medicine Singapore*. 2008;37(12):1012