Factors Influencing Medical Students' Learning Approach in Qatar

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Abstract

Background

This study investigated the relevance of the two-factor R-SPQ-2F questionnaire designed by Biggs et al for exploring the learning approaches of medical students in Qatar and identify whether factors like gender, year level, and educational attainment influence student learning.

Methods

The sample consisted of 108 medical students (44% male, 56% female) from all four years of medical school at Weill Cornell Medicine-Qatar (WCM-Q). Participants completed the 20-item R-SPQ-2F questionnaire to measure their learning approaches through a two-factor structural model that contrasts deep and surface learning. Participants also completed a survey collecting demographic information.

Results

Statistical analysis revealed significant differences in deep learning approaches across year levels for both males and females. Additionally, educational attainment played a significant role in learning approach preference.

Conclusions

Based on structural equation modeling, this cross-verification study supports the two-factor R-SPQ-2F instrument and offers additional evidence for its robustness and application to medical education. These findings may help educational and program leaders in Qatar better understand medical students' learning approaches to enhance their pedagogical practices.

Background

Medical education aims to cultivate compassionate, committed physicians who think deeply and critically about patient care (1). Patients expect competent doctors who understand the latest developments in medical research and incorporate them into their practice. Therefore, educators in medicine and allied health professions have implemented innovative teaching strategies, including problem-based learning (PBL) and inquiry-based pedagogy, to develop critical thinking, analytical reasoning, and metacognitive awareness (2). However, these strategies often contrast with common assessment strategies that emphasize achievement on multiple-choice exams. This draws attention to how the structure of learning/assessment tasks influence students' learning approaches.

Students manage learning tasks differently according to their perceptions. For instance, Marton and Säljö found that university students managed a reading task at either *surface* or *deep* levels based on their expectations about assessment (3). While surface-level learners focused on the text, assuming a "reproductive" approach that emphasized rote learning of specific details, deep-level learners concentrated on the intentions behind the text, aiming to understand the author's meaning. Marton and Säljö contend that students adapted their approach to the task based on expectations, which shaped their learning quality (4). Thus, students expecting multiple-choice questions adopted a surface approach to find specific details. On the other hand, students expecting essay questions adopted a deep approach to identify general principles and main points. While the purpose of assessment is to define requirements and signify mastery, when students employ a surface approaches, they trivialize the learning task and limit their scope of learning (4).

However, student perceptions are not the only factor influencing learning approach. Preference for surface or deep learning approaches results from dynamic interaction between student characteristics and the teaching/learning context, which includes the features of learning tasks. For instance, Biggs et al argue that students adopt a surface approach when motivated

by a desire for achievement and/or fear of failure (5). In such cases, they employ surface-level strategies like selective memorization to attain the least amount of knowledge necessary to pass the test. By contrast, students adopt a deep approach when motivated by intrinsic interest, using deep-level strategies to fully engage with learning tasks and maximize meaning. To illustrate the dynamic, contextual nature of students' choice of learning approach, Biggs et al developed the "3P" model of teaching and learning (5).

The "3P" model describes how student characteristics, teaching context, learning tasks, and learning outcomes interact to constitute a dynamic system of teaching and learning. The three "Ps" are *presage*, *process*, and *product*, which influence and interact with one another. Presage elements include student characteristics like prior knowledge, ability, and preferred learning approach and teaching context factors such as learning objectives, assessment strategies, classroom environment, instructional methods, and institutional procedures. Next, process refers to students' on-going approaches toward learning tasks. Lastly, product denotes the outcome of learning – the knowledge and skills that result from participation in learning tasks. This reciprocal model for teaching and learning suggests that choice of surface or deep learning approach is a contextual rather than essential student characteristic. This realization empowers teachers to design courses with learning tasks and assessments that foster motivation and promote strategies for deep learning. For this reason, Biggs et al composed the revised two-factor study process questionnaire (R-SPQ-2F) to help educators and curriculum developers assess the quality of their teaching and learning environments (5).

Fostering deep learning approaches and encouraging inquiry and innovation are important topics in medical and allied health professional education (2). Recent studies have explored how learning approach relates to career preference, clinical experiences, progress testing and perceived stress, and PBL (6–9). Several studies have statistically validated the R-SPQ-2F while exploring medical students' learning approaches. For instance, Vaughan performed a confirmatory factor analysis to support the instrument's reliability and validity in his study of Australian osteopathy students, as did Shaik et al in their study of the learning approaches of medical students in Saudi Arabia (10,11).

Recent studies from the Middle East and Sub-Saharan Africa indicate that medical students prefer deep approaches. Shaik et al administered the R-SPQ-2F to 622 participants at King Saud University's College of Medicine and discovered a strong preference for deep approaches for all medical students, though students with high GPA and those studying more than five hours per day scored highest (11). Similarly, Tetik et al explored the relationship between learning approach and curriculum at three medical schools in Turkey using hybrid, integrated, and PBL curricula respectively (12). After administering the R-SPQ-2F to nearly 1,000 students, the authors discovered that only the medical school using PBL showed no decline in deep approach in the second year. Based on this finding, they concluded that PBL fosters deeper approaches to learning than other forms of curriculum due to the more supportive, collegial nature of the PBL environment (12). Lastly, Mogre and Amalba explored the learning approaches of medical students at a university in Ghana using a PBL curriculum. They determined that students transition to deep approaches as they mature, suggesting that time in program and PBL experience foster intrinsic motivation and deep learning strategies (9).

These studies from diverse geographical contexts stimulated our interest into the learning approaches of medical students in Qatar. Administering the R-SPQ-2F to medical students in Qatar will further validate the instrument and provide valuable insights into the factors influencing learning approach preference. Furthermore, Weill Cornell Medicine-Qatar (WCM-Q), the research setting, recently revised its curriculum to feature individualized learning, research training, and inquiry-based pedagogies like PBL. However, traditional assessments like multiple-choice examinations continue to dominate student experience, especially the United States Medical Licensing Examination (USMLE) Step 1, a standardized exam that students take after their second year of medical school. Thus, our aim was to explore the relationship between student characteristics, learning tasks, and learning approach during a time of curricular transition.

Methods

Setting

Weill Cornell Medicine-Qatar (WCM-Q) was established in 2001 as a branch campus of Weill Cornell Medicine in New York (USA). WCM-Q offers an accelerated six-year program leading to the M.D. degree, and its curriculum follows the main campus in New York (13). After two years of premedical study, the four-year medical program features integrated courses combining basic sciences, clinical skills, and physicianship, which encompasses professionalism, ethics, and medical humanities. Courses feature teaching methods such as problem-based learning (PBL), case-based learning, flipped classrooms, longitudinal patient experiences, clinical skills workshops, interactive sessions, and small-group discussions (14).

Participants

Eligible participants included medical students 18 years and older currently enrolled at WCM-Q (approximately 200 students). The participants ($n = 108$) represented all four years of medical school (MED 1-4) and included various nationalities, including Qatari nationals and expatriates. They were 56 percent female ($n = 61$) and 44 percent male ($n = 47$).

Instrument

To measure learning approach, we used the R-SPQ-2F by Biggs et al (5). This instrument measures how learners perceive and engage with learning tasks in specific educational contexts. It is comprised of 20 5-point Likert scale items ranging from *never or only rarely true of me* to *always or almost always true of me*. The R-SPQ-2F displays results on a two-scale matrix – Deep Approach (10 items) and Surface Approach (10 items) (5). Deep Approach items assess intrinsic interest and motivation for learning through statements like “I find that at times studying gives me a feeling of deep personal satisfaction” and “I find most new topics interesting and often spend extra time trying to obtain more information about them.” By contrast, Surface Approach items assess strategic learning motivated by course factors like examinations using statements like “My aim is to pass the course while doing as little work as possible” and “I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.” The R-SPQ-2F involves four subscales – Deep Motive (DM), Deep Strategy (DS), Surface Motive (SM), and Surface Strategy (SS). While motives describe learners’ intentions for engaging in a learning task (e.g. fear of failure, achievement, intrinsic interest), strategies describe how learners go about completing tasks (e.g. rote memorization, relating new knowledge to previous learning) (5,15).

Concurrent with the R-SPQ-2F, participants completed the “How Students Choose Medical Specialties” (HSCMS) survey, which was adapted from a study of Canadian medical students to the Qatari context (16). In addition to items involving students’ choice of medical specialty, the HSCMS collected demographic information including gender, age, educational attainment, parental educational attainment, and medically relevant experiences.

We released the combined instruments online in September 2019 using Qualtrics software. The analysis of data was performed using IBM SPSS v24 and AMOS Graphics. The data are reliable based on Cronbach’s alpha values: Deep Approach (.781) and Surface Approach (.785).

Ethical Considerations

We obtained approval to conduct the study from the Weill Cornell Medicine-Qatar Institutional Review Board (Reference Number 18-00009). Consenting participants were informed of the study’s aims and provided the consent form online.

Results

First, we employed structural equation modeling (SEM) to confirm the underlying two-factorial structure for the 20-item R-SPQ-2F. This verified the instrument’s construct validity with data collected from WCM-Q medical students. The model shown in Fig. 1 includes the items of the main scales *a priori* (5). The initial chi-square statistic result was $\chi^2 = 217.24$, $df = 163$, $p < .003$, indicating the model’s testability. We then evaluated the measurement model for the fitness of indices, including the comparative fit index (CFI) and the root mean square error of approximation (RMSEA) (17). Results demonstrated a satisfactory fit for the data ($CFI = .92$; $RMSEA = .49$; $SRMR = .07$) (18,19). (Fig. 1)

Table 1 presents descriptive statistics of medical student responses to the deep approach (DA) and surface approach (SA) subscales. It also presents the results of a one-way ANOVA that illustrates variances in learning approach between the different year levels (MED 1 to MED 4). (Table 1) Table 1 indicates that medical students reported varying levels of preference for deep approach, but surface approach remained constant. MED 3 reported the greatest preference for deep approach (3.06) and MED 2 reported the lowest (2.55). The F of 2.701 indicates significant differences in deep approach toward medical learning at WCM-Q. (Table 2)

Tables 2, 3, and 4 explore the influence of student characteristics like gender, educational attainment, and medically relevant experiences on learning approach preference. Table 2 indicates that male students (2.97) prefer deep approaches more than female students (2.67), with a statistically significant difference between the groups. On the other hand, no significant gender differences were identified for surface approach. (Table 3)

Table 3 illustrates the association between educational attainment and learning approach using one-way ANOVA analysis. As shown in the table, no statistically significant differences arose; however, students with non-science qualifications ($n = 2$) preferred deeper learning approaches than their peers. By contrast, mean scores for surface approach preference ranged from 1.10 (Bachelor of Arts) to 2.95 (Masters). (Table 4)

Table 4 demonstrates the relationship between medically relevant experiences and learning approach. Medically relevant experiences refer to employment, volunteer experience, history of major health problems, or having a close family member as a patient. Exceptionally, one student cited other reasons and fifteen students did not specify any prior experiences. As shown in Table 4, there were no statistically significant differences between the students' learning approaches. However, based on mean scores, factors like employment, volunteer experience, and having a close family member as a patient correlated to greater preference for a deep approach. By contrast, surface approach was not influenced by any of these factors.

Discussion

This study explored the factorial structure of the R-SPQ-2F for medical students in Qatar and examined how student characteristics like gender, educational attainment, and medically relevant experiences correlate to preference for deep or surface approaches. First, the statistical validation reaffirms the R-SPQ-2F as a reliable and valid instrument, supporting previous studies from various national and cultural contexts (10,11,18,20). Furthermore, the reiteration of acceptable fit indices - as outlined in the results section - from the two-factor model supports the theoretical interpretability of the subscales for understanding the learning approaches of medical students in Qatar.

Although medical students at WCM-Q prefer a deep approach overall, our data show that preferences vary across year level. This finding resonates with studies from Saudi Arabia, Turkey, and Australia, which suggest that medical students prefer a deep learning approach. However, the intensity of preference fluctuates according to contextual factors such as curriculum and assessment (11,12, 20). Interestingly, preference for a surface approach decreased as students advanced through the medical program, supporting previous findings that reliance on a surface approach reduces with greater maturity (9, 21). WCM-Q's new integrated courses work to sustain the deep approach to learning, as they feature diverse assessments, varied experiences (including early clinical exposure), and student-centered teaching methods. We attribute the slight decline in preference for a deep approach to learning from second-year medical students to preparation for the USMLE Step 1 exam, an eight-hour multiple-choice licensing examination. Students spend March and April of their second year preparing for this high-stakes examination, which encourages a surface approach to learning. During this period, just before clerkships begin, medical students lose focus on their intrinsic motivation for medicine and concentrate on achieving a good exam result instead. This upholds the findings of research into high-stakes testing in schools, which showed that high-stakes testing narrows the curriculum, diminishes teaching and learning quality, and encourages a strategic/surface approach to learning (21, 22). It also resonates with the findings of Tetik et al, who identified a slight reduction in deep approach for second-year students at two of the three medical schools they examined (12). The USMLE Step 1 (MED 2) and involvement in off-campus hospital clerkships (MED 3) may also explain the relatively lower response rates for these year levels, though studies have shown that response rates for online surveys trend low (8, 23).

As indicated in the “3P” model, student characteristics like gender, educational attainment, and previous experience interact with the teaching context to influence preference for deep learning. Regarding gender, we found a statistically significant difference between males and females, with males more likely to prefer a deep approach to learning. This contrasts with earlier studies, which found either no difference or stronger preference among females for deep approaches (9, 21, 25, 26). We attribute this difference to cultural and contextual factors. For instance, Abu-Hilal et al suggest that differential socialization for boys and girls in Gulf Arab societies influences self-concept, goal orientation, and academic achievement (28). According to the authors, girls in Gulf Arab cultures acquire a self-improving orientation aimed at correcting limitations while boys develop a self-enhancing orientation characterized by an “unrealistically positive self-opinion” (28). Studies show that girls in Gulf Arab countries academically outperform boys, and Abu-Hilal et al ascribe their higher academic achievement to greater extrinsic motivation and an improvement-oriented self-concept (28,29). In other words, girls in Gulf Arab societies face greater pressure to achieve due to more limited educational and career options, and this “achievement anxiety” inhibits a deeper approach to learning. However, Abu-Hilal et al observe that Gulf Arab culture and society are rapidly transforming, so additional research is needed to validate this interpretation (28).

Medical students’ educational attainment and medically relevant experiences mildly correlated with preferences for a deep approach to learning. Medical students with high-school qualifications demonstrated a lower preference for deep approach than their peers with post-secondary qualifications; however, this could also be attributed to greater maturity. Remarkably, while only two participants had nonscience backgrounds, they showed lower preference for a surface approach. That being said, several studies have indicated that the greatest single predictor of success in medical school and residency is academic achievement, irrespective of undergraduate discipline (30–33). Lastly, medically relevant experiences like previous employment in a healthcare field, medical volunteer experiences, and having an ill family member, contributed to the preference for a deep approach to learning. This suggests that early exposure to medicine and healthcare organizations may enhance intrinsic motivation for learning about medicine.

Conclusion

The results from this study reaffirmed the reliability and validity of the R-SPQ-2F as a tool for measuring students’ deep and surface learning approaches, which supports the findings of earlier studies. The R-SPQ-2F’s two-factor structure showed acceptable fit indices, confirming the instrument’s utility for understanding the learning approaches of medical students in Qatar. As this was the first time such a study has been conducted in Qatar, our results are exploratory. First, our finding that medical students prefer a deep approach and that reliance on a surface approach decreases over time is consistent with previous studies. Contextual factors like the high-stakes USMLE examination for second-year students may have triggered temporary declines in the preference for a deep approach. Second, our finding that male students prefer a deep learning approach more than female students contrasted with earlier studies, which found either no difference or greater preference for a deep approach among female students. This difference may arise from Qatar’s cultural context, but further research is needed to confirm this interpretation. Lastly, our finding that educational attainment and medically relevant experiences and having an ill family member correlate to preference for a deep approach may be due to the opportunities these experiences offer for learning about medicine and healthcare more broadly. Mature, academically experienced students and those with significant early exposure to medicine are more likely to find medicine intrinsically interesting. Future research should investigate various aspects of WCM-Q’s teaching context, including curricular innovations and pedagogical practices, and how these enhance or reduce the preference for a deep learning approach. These findings may help medical education leaders in Qatar improve pedagogical practices and student outcomes.

Abbreviations

CFI	Comparative Fit Index
DA	Deep Approach
DM	Deep Motive

DS	Deep Strategy
GPA	Grade Point Average
HSCMS	How Students Choose Medical Specialties
MED 1	First-Year Medical Students
MED 2	Second-Year Medical Students
MED 3	Third-Year Medical Students
MED 4	Fourth-Year Medical Students
PBL	Problem-Based Learning
RMSEA	Root Mean Square Error of Approximation
R-SPQ-2F	Revised Study Process Questionnaire - Two Factor
SA	Surface Approach
SEM	Structural Equation Modeling
SM	Surface Motive
SRMR	Standardized Root Mean Squared Residual
SS	Surface Strategy
USMLE	United States Medical Licensing Examination
WCM-Q	Weill Cornell Medicine-Qatar

Declarations

Ethics approval and Consent to Participate

The research was approved and supervised by the Institutional Review Board at Weill Cornell Medicine-Qatar (Reference Number 18-00009). All methods were carried out in accordance with the Declaration of Helsinki (1975) and its later amendment (2013), and informed consent was obtained from all participants.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

Authors' contributions

The initial idea for the study and instruments for research came from SSQ, and after discussions with the Medical Education Department, an arrangement was made to collaborate with AHL and VRV. All authors made substantial contribution to the design of the study. Statistical analysis was carried out by VRV, as well as methods and results contribution in the first draft of the manuscript. SSQ contributed to the introduction and AHL wrote the discussion section, contributed to the other sections, and completed the final draft. All authors contributed to the revisions, read the drafts, and approved the final manuscript.

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Tables

Table 1: Learning approach: Descriptive statistics and one-way ANOVA results

Scale	MED 1 (n = 36)		MED 2 (n = 20)		MED 3 (n = 19)		MED 4 (n = 33)		<i>F</i>	Sig. (* <i>p</i> <0.05)
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
DA	2.89	0.68	2.55	0.45	3.06	0.63	2.70	0.67	2.701	0.049*
SA	2.51	0.79	2.35	0.57	2.27	0.58	2.34	0.65	0.612	0.61

Table 2: Gender and learning approach preference

Scale	Female (n = 61)		Male (n = 47)		<i>F</i>	Sig. (* <i>p</i> <0.05)
	Mean	Std. Dev.	Mean	Std. Dev.		
DA	2.67	0.66	2.97	0.60	5.895	0.017*
SA	2.30	0.67	2.49	0.68	2.054	0.155

Table 3: Educational attainment and learning approach

Scale	High School (n = 83)		B.S. (n = 12)		B.A. (n = 2)		Masters (n = 2)		Other (n = 9)		<i>F</i>	Sig. (<i>p</i> <0.05)
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
DA	2.75	0.63	2.88	0.66	3.60	0.14	3.20	0.57	2.86	0.80	1.15	0.337
SA	2.39	0.65	2.33	0.65	1.10	0.65	2.95	0.65	2.57	0.65	2.49	0.048

Table 4: Medically relevant experiences and learning approach

Employment (n = 6)		Volunteering (n = 58)		Major health problem (n = 4)		Family member as a patient (n = 24)		Other (n = 1)		None (n = 15)		F	Sig.
Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.		
3.17	0.78	2.81	0.7	2.68	0.492	2.86	0.53	2.8		2.54	0.6	0.939	0.459
2.32	0.58	2.3	0.74	2.68	0.403	2.43	0.66	2.4		2.6	0.52	0.672	0.646

Figures

Figure 1

Two-factor measurement model of the R-SPQ-2F with four subscales