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RESEARCH ARTICLE

Assessment of Learning Approaches of Saudi Dental Students Using the Revised Two-Factor Study Process Questionnaire: A Cross-Sectional Study

Fatemah Alahmari[1,*] , Amani Basudan[1] and Marwa Shaheen[1]

[1]*Department of Periodontics and Community Dentistry, College of Dentistry, King Saud University, Riyadh, Saudi Arabia*

Abstract:

Purpose:

The aim of this study was to assess the learning approaches of undergraduate dental students in Saudi Arabia.

Methods:

This was a cross-sectional study in which an electronic questionnaire using the Biggs Revised two-factor Study Process Questionnaire (R-SPQ-2F) was completed by 222 undergraduate dental students from 1st year to 5th year. R-SPQ-2F contains 20 items to measure learning approaches through a structural model contrasting deep and surface learning.

Results:

The mean value of the deep approach was higher among 4th- and 5th-year students than among 1st-, 2nd-, and 3rd-year students. The mean values of the surface approach in male subjects and subjects with lower grade point averages were statistically significantly higher than those of the deep approach.

Conclusion:

This study highlights that dental students have a greater tendency to adopt the surface approach in their preclinical years and in the 3rd year when they experience a transition to clinical training. A deep approach to learning was mostly adopted among 4th- and 5th-year dental students. The surface approach was higher among male than female students. Students who used a deep approach had higher academic achievement than students who used a surface approach.

Keywords: Learning approach, Dental education, R-SPQ2F questionnaire, Saudi dental students, Surface learning approach, Deep learning approach.

1. INTRODUCTION

The success of the educational experience in higher education is significantly influenced by the student's learning approach [1]. Students approach their learning in various ways based on the nature of their relationship with the learning environment [2]. Understanding how students learn allows educational institutions to implement changes to their instructional strategies that are appropriate for students' learning approaches [3].

The learning approach concept was first introduced by Marton and Säljö in 1976. There are two qualitatively different approaches to learning: the surface approach and the deep approach [4]. In the deep approach, students process information, critically analyze it, and link it to previously known knowledge, which leads them to comprehend concepts, retain them long-term, and use them for problem-solving in unfamiliar contexts. However, surface learners attempt to fulfill a course's minimum requirements and memorize information they consider essential for assessment rather than understanding it, resulting in superficial knowledge retention [5].

The all-encompassing goal of good teaching is to motivate students to take a deep approach while discouraging them from taking a surface approach [6]. It is well established that students' learning approaches can have an impact on their

* Address correspondence to this author at the Department of Periodontics and Community Dentistry, College of Dentistry, King Saud University, Riyadh, Saudi Arabia; Tel: 00966118056096; E-mail: falahmari@ksu.edu.sa

academic success [7, 8]. Moreover, the possibility of inserting three-dimensional examination and software allows a good understanding of the pathologies and subsequent treatment possibilities [9]. Several factors can contribute to deep learning, such as student-centered learning, an integrated curriculum, and constructive alignment [10]. Measuring students' learning approaches can be helpful for supporting individual academics who are interested in improving the quality of their teaching and assisting students in adopting a deeper approach to learning [11].

A variety of instruments have been developed to assess learning approaches. John Biggs's revised two-factor study process questionnaire (R-SPQ-2F) is among the most extensively used instruments for assessing learning approaches [6]. It has several advantages over other instruments, including its concise length and ease of interpretation.

The learning approaches of Saudi dental student students have not yet been documented. The aim of this study was to assess the learning approaches among dental students at King Saud University (KSU) using the R-SPQ-2F questionnaire.

2. METHODS

2.1. Study Design

This cross-sectional study was performed among dental students to explore the learning approaches of Saudi Arabian dental students at KSU. The dental school system encompasses five years of undergraduate education. Year one of dental school involves didactic basic science education, year 2 involves pre-clinical basic dental education, and years 3, 4, and 5 involve clinical education.

2.1.1. Ethical Consideration

The research project was approved by the Institutional Review Board for Health Sciences Colleges Research on Human Subjects, KSU (KSU-IRB 017-E).

2.1.2. Participants

The participants included undergraduate dental students from 1st to 5th year, at King Saud University, Riyadh, Saudi Arabia. An electronic survey was distributed anonymously through email between April 1, 2022, and June 1, 2022, using Google Forms (Google LLC).

Data were collected using the R-SPQ-2F questionnaire, which was developed by Biggs *et al*. in 2001 [6]. The questionnaire measures deep and surface learning approaches. It is a 20-item questionnaire, and each approach consists of 10 items. A 5-point Likert scale was used to evaluate both approaches (1: never or only rarely true for me; 2: sometimes true for me; 3: true for me about half the time; 4: frequently true for me; and 5: always or almost always true for me). The outcome of R-SPQ-2F was determined to be the learning approach, whether the deep approach (Σ deep motive scores + deep strategy scores) or the surface approach (Σ surface motive scores + surface strategy scores).

2.1.3. Statistical Analysis

The data were analyzed using IBM SPSS statistical software for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to describe the categorical and quantitative variables. Student's *t*-test was used for a single sample to compare the mean difference between the two factors (deep and surface approaches). Also, Student's *t*-test for independent samples and one-way analysis of variance was followed by a post hoc test for quantitative outcome variables to compare the mean values of the four facets (deep motive, deep strategy, surface motive, surface strategy) for the categorical study variables (gender, year of study, and grade point average).

3. RESULTS

Out of 222 study subjects, 59% were females, 55% were 2nd- and 4th-year students, and 78.8% had a grade point average (GPA) of 4.5–5.0. The mean values of the four facets range between 12.21 and 16.19, and the mean values of the two factors, the deep approach and the surface approach, are 26.75 and 28.40, respectively (Table **1**).

The comparison of the mean values of the deep approach factor and its two facets in the R-SPQ-2F in relation to the gender, GPA, and study year of the dental students show a statistically significant difference for the year of study and GPA. That is, the mean values of the deep motive facet show a statistically significant difference across the 5 years of study: the mean values of the deep motive are significantly higher in 4th- and 5th-year subjects than in the subjects of other years ($F = 6.200$, $p < 0.0001$). The post hoc test indicates that the mean values for 4th- and 5th-year subjects are significantly higher than those for 1st-year subjects. Also, the mean values for deep strategy and deep approach are significantly higher for 5th-year subjects than those for subjects from other years ($F = 4.541$, $p = 0.002$ *vs*. $F = 5.398$, $p < 0.0001$). The post hoc test indicates that the deep strategy mean values for 4th- and 5th-year subjects are significantly higher than those for 1st-, 2nd-, and 3rd-year subjects. Also, the deep approach mean values for 4th- and 5th-year subjects are significantly higher than those for 1st-, 2nd-, and 3rd-year subjects. The mean values of deep motive and deep approach are statistically significantly higher in the subjects whose GPA is between 4.5 and 5.0 than those of subjects whose GPA is between 3.0 and 4.49 ($t = -4.510$, $p < 0.0001$; $t = -3.464$, $p = 0.001$), but there is no statistically significant difference in the mean values of deep strategy between the two categories of GPA. No statistically significant difference was observed between male and female subjects in the mean values of deep motive, deep strategy, or deep approach (Table **2**).

The comparison of mean values of the surface approach factor and its two facets (surface motive and surface strategy) of R-SPQ-2F in relation to the gender, GPA, and study year of dental students show a statistically significant difference for the year of study for one of the facets (surface strategy). That is, the mean values of surface strategy are statistically significantly different across the 5 years of study: the mean values of the surface strategy of 5th-year subjects are

statistically significantly lower than those for subjects of other years (F = 2.587, p = 0.038). However, the mean values of surface motive, surface strategy, and surface approach are not statistically significantly different by gender and GPA (Table **3**).

Table 1. Distribution of characteristics of dental students and descriptive statistics of 4 facets and 2 factors of R-SPQ-2F questionnaire.

Characteristics	Number (%)	Mean (Sd.)
Gender		
Male	91(41.0)	
Female	131(59.0)	
Year of study		
1st year	41(18.5)	
2nd year	53(23.9)	
3rd year	32(14.4)	
4th year	69(31.1)	
5th year	27(12.2)	
GPA		
3.0-4.49	47(21.2)	
4.5-5.0	175(78.8)	
R-SPQ-2F		
Deep Motive		13.34(3.3)
Deep Strategy		13.41(3.4)
Surface Motive		12.21(3.9)
Surface Strategy		16.19(3.5)
Deep Approach		26.75(5.8)
Surface Approach		28.40(6.5)

Table 2. Comparison of mean values of deep approach factor and its 2 facets of R-SPQ-2F in relation to the gender, GPA and study year of dental students.

Characteristic	Deep motive			Deep strategy			Deep Approach		
	Mean (Sd.)	t-value/ F-value	p-value	Mean (Sd.)	t-value/ F-value	p-value	Mean (Sd.)	t-value/ F-value	p-value
Gender									
Male	13.04 (3.2)	-1.106	0.270	13.72 (3.1)	1.152	0.250	26.77 (5.1)	0.046	0.964
Female	13.54 (3.4)			12.19 (3.6)			26.73 (6.3)		
Year of study									
1st year	11.34 (2.0)	6.200	<0.0001	13.02 (3.5)	4.541	0.002	24.36 (4.8)	5.398	<0.0001
2nd year	13.24 (4.0)			12.81 (3.9)			26.05 (7.5)		
3rd year	13.28 (3.0)			12.44 (3.0)			25.72 (5.3)		
4th year	14.19 (3.2)			13.67 (2.5)			27.85 (4.8)		
5th year	14.44 (2.7)			15.67 (3.6)			30.11 (4.7)		
GPA									
3.0-4.49	11.48 (2.5)	-4.510	<0.0001	12.70 (3.5)	-1.613	0.108	24.19 (5.3)	-3.464	0.001
4.5-5.0	13.83 (3.3)			13.60 (3.3)			27.43 (5.8)		

Table 3. Comparison of mean values of surface approach factor and its 2 facets of R-SPQ-2F in relation to the gender, GPA and study year of dental students.

Characteristic	Surface motive			Surface strategy			Surface Approach		
	Mean (Sd.)	t-value/ F-value	p-value	Mean (Sd.)	t-value/ F-value	p-value	Mean (Sd.)	t-value/ F-value	p-value

(Table 3) contd.....

Gender									
Male	12.70 (3.7)	1.561	0.120	16.44 (3.3)	0.888	0.375	29.14 (6.1)	1.424	0.156
Female	11.87 (4.0)			16.01 (3.6)			27.88 (6.7)		
Year of study									
1st year	12.05 (4.0)	1.126	0.345	16.68 (3.6)	2.587	0.038	28.73 (7.0)	0.214	0.931
2nd year	11.90 (4.3)			16.04 (3.0)			27.94 (6.7)		
3rd year	11.68 (3.0)			16.50 (2.9)			28.18 (5.4)		
4th year	12.23 (3.7)			16.61 (3.7)			28.84 (6.7)		
5th year	13.6 (4.3)			14.29 (3.8)			27.93 (6.2)		
GPA									
3.0-4.49	12.74 (4.3)	1.049	0.295	16.36 (3.3)	0.380	0.704	29.10 (6.7)	0.839	0.402
4.5-5.0	12.07 (3.8)			16.14 (3.5)			28.21 (6.4)		

The comparison between the mean scores of the deep approach and surface approach for all subjects by gender, year of study, and GPA is given in Table **4**. For gender, the mean values of the surface approach in male subjects are statistically significantly higher than those for the deep approach [t = -2.70, p = 0.008], whereas the mean values for deep and surface approaches are not statistically significantly different in female subjects. For the year of study, the mean values of the surface approach are significantly higher than those of the deep approach for 1st- and 3rd-year subjects [t = -3.01, p = 0.004 *vs*. t = -2.50, p = 0.018], but they are not significantly different for 2nd-, 4th-, and 5th-year subjects.

For GPA, the mean values of the surface approach are significantly higher than those of the deep approach in subjects with a GPA of 3.0–4.49 (t = -4.29, p < 0.0001), but there is no significant difference in the mean values of the deep approach and surface approach in subjects with a GPA of 4.5–5.0. There is a highly statistically significant difference between the mean values of the surface approach and the deep approach for all the subjects: the mean values of the surface approach are significantly higher than those of the deep approach (t = -2.85, p = 0.005; Table **5**).

Table 4. Comparison between the mean scores of deep approach and surface approach in relation to gender, GPA and study year and all study subjects.

Characteristic	Deep Approach	Surface Approach	Difference of mean scores	t-value	p-value	95% CI difference
Gender						
Male	26.77(5.1)	29.14(6.1)	-2.37	-2.70	0.008	-4.12, -0.63
Female	26.73(6.3)	27.88(6.7)	-1.15	-1.49	0.137	-2.68, 0.37
Year of study						
1st year	24.36(4.8)	28.73(7.0)	-4.37	-3.01	0.004	-7.30, -1.43
2nd year	26.05(7.5)	27.94(6.6)	-1.90	-1.69	0.097	-4.13, 0.36
3rd year	25.72(5.3)	28.19(5.4)	-2.47	-2.50	0.018	-4.48, -0.45
4th year	27.85(4.8)	28.84(6.7)	-0.99	-0.90	0.370	-3.16, 1.19
5th year	30.11(4.7)	27.92(6.2)	2.19	1.21	0.237	-1.53, 5.90
GPA						
3.0-4.49	24.19(5.3)	29.10(6.7)	-4.91	-4.29	<0.0001	-7.22, -2.61
4.5-5.0	27.43(5.8)	28.21(6.4)	-0.78	-1.19	0.236	-2.07, 0.51
Subjects						
All Subjects	26.75(5.8)	28.40(6.5)	-1.65	-2.85	0.005	-2.79, -0.51

Table 5. Factor loadings of deep approach and surface approach of R-SPQ-2F questionnaire among the dental students.

R-SPQ-2F and its items	Deep Approach	Surface Approach
1.I find that at times studying gives me a feeling of deep personal satisfaction.	.414	-.083
2. I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied.	.324	.209
3. My aim is to pass the course while doing as little work as possible.	.155	.575
4. I only study seriously what's given out in class or in the course outlines.	-.243	.447
5. I feel that virtually any topic can be highly interesting once I get into it.	.483	.174
6. I find most new topics interesting and often spend extra time trying to obtain more information about them.	.561	-.105
7. I do not find my course very interesting so I keep my work to the minimum.	.244	.628

(Table 5) contd.....

8. I learn some things by rote, going over and over them until I know them by heart even if I do not understand them.	.085	.233
9. I find that studying academic topics can at times be as exciting as a good novel or movie.	.517	-.014
10. I test myself on important topics until I understand them completely.	.491	-.003
11. I find I can get by in most assessments by memorizing key sections rather than trying to understand them.	.078	.598
12. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.	-.230	.734
13. I work hard at my studies because I find the material interesting.	.722	-.312
14. I spend a lot of my free time finding out more about interesting topics which have been discussed in different classes.	.762	.076
15. I find it is not helpful to study topics in depth. It confuses and wastes time, when all you need is a passing acquaintance with topics.	-.021	.664
16. I believe that lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.	.004	.344
17. I come to most classes with questions in mind that I want answering.	.352	.016
18. I make a point of looking at most of the suggested readings that go with the lectures.	.490	.160
19. I see no point in learning material which is not likely to be in the examination.	-.078	.569
20. I find the best way to pass examinations is to try to remember answers to likely questions	-.019	.566

Deep Approach = [1, 2, 5, 6, 9, 10, 13, 14, 17, 18]
Surface Approach = [3, 4, 7, 8, 11, 12, 15, 16, 19, 20]

4. DISCUSSION

Dental schools place a high priority on regularly developing the curriculum and conducting assessment. However, evaluating how these activities affect students' learning is rarely given any thought. The objective of this study was to assess the learning approach measured by the two-factor SPQ among Saudi dental students. To the best of our knowledge, this is the first study to assess the learning approaches of dental students in Saudi Arabia.

The present study indicated that most dental students prefer the surface approach over the deep approach. The number of students who adopt the deep approach in years 4 and 5 is higher than in the remaining years. Moreover, the surface strategy score of 5th-year subjects is lower than subjects of other years. These results are consistent with those of other studies that show a drop in surface approaches with time spent in dental schools [12 - 14]. A possible explanation for this might be that the students are continuing their externally driven, memorization-based learning style from high school. Moreover, the lecture is the main delivery mode in these years, and the learning is teacher-centered. Later, as training progresses, they are gradually adapting to their new learning environment, which encourages critical thinking. Also, it seems possible that because dentistry courses are given in English, which is a secondary language in Saudi Arabia, most students complete their secondary education in the native language (Arabic). When new medical and dental terms are introduced in the courses, it is challenging for the students to learn new terminology and expand their vocabulary. As a result, in the beginning years of their study, they adopt a surface approach by memorizing the facts and using mnemonics to recall information. When students experience a transition to clinical training in the 3rd year, they experience higher levels of stress; therefore, it is difficult for them to adopt the deep approach [15].

In the current study, comparing male and female students showed that male subjects used the surface approach more than the deep approach, whereas female students used both deep and surface approaches. This is in agreement with other studies that have found similar gender differences, though some investigators found that gender did not significantly affect the approach to learning [2, 16 - 19].

Another important finding is that the students who had lower GPAs had significantly higher mean scores for the surface approach than for deep approach. While Wilkison *et al*. concluded that the learning approach has no effect on students' academic performance, our findings, match those of several studies that found that academic achievement is influenced by students' learning approach [18, 20 - 23]. Therefore, it is important to encourage surface learners to change their approach to promote their understanding and long-term retention of knowledge.

The results of this study are significant because it is the first published study investigating the learning approach among dental students in Saudi Arabia. Our study findings lead to several recommendations for dental education. It is necessary to review the education system, including curriculum, teaching strategies, and assessment methods, to promote lifelong learning among dental students. Additionally, implementing problem-based learning through vertically and horizontally integrated curricula will help students improve their critical thinking and problem-solving, so they can adopt a deep approach.

The diversity of curricula in dental schools limits the generalizability of our findings. This study design is -sectional, limiting our ability to evaluate dynamic student progress through the years. Therefore, we recommend more longitudinal studies at different dental schools with similar or different curricula.

CONCLUSION

This study highlights that dental students have a greater tendency to adopt a surface approach when they are in their preclinical years and in the 3rd year, when they experience a transition to clinical training. The deep approach to learning was mostly adopted among 4th- and 5th-year dental students.

The surface approach was more frequent among male than among female students. Students who used a deep approach had higher academic achievement than students who used a surface approach. Further longitudinal studies with different and similar curricula are needed to confirm the findings and help to improve the dental curriculum to promote life-long learners.

LIST OF ABBREVIATIONS

R-SPQ-2F = Revised two-factor Study Process Questionnaire

KSU = King Saud University

GPA = Grade Point Average

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Institutional Review Board approved the research project for Health Sciences Colleges Research on Human Subjects, KSU (KSU-IRB 017-E).

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans were used in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

CONSENT FOR PUBLICATION

Participation consent was implied by completing the survey.

AVAILABILITY OF DATA AND MATERIALS

The quantitative data regarding all variables that were measured in the current study are available from the corresponding author [F.A] upon reasonable request.

STANDARDS OF REPORTING

STROBE guidelines and methodologies were followed in this study.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

AUTHOR'S CONTRIBUTION

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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