



Relationship between Learning Approaches and Students' Preferences for Online Learning

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Abstract

Objectives: The objective of this study is to enhance the quality of medical education by exploring the learning approaches of students and their relationship with the student's preference for online learning in a Problem-Based Learning (PBL) Program. **Subjects and Methods:** The study was a descriptive, cross-sectional one; the target population included a random sample of students in the 1st, 2nd and 3rd years (n = 300). The study was conducted at the Faculty of Medicine, Suez Canal University in Ismailia, Egypt during the academic year 2021-2022. The instrument used for data collection is named "a Two-Factor Study Process Questionnaire (R-SPQ-2F)" (Arabic Version). **Results:** In this study, the students mostly adopt deep learning strategies (72.3%) compared to superficial learning strategies (27.7%). The current study shows that females mostly adopt deep learning strategies (75.8%) compared to males who adopted deep learning strategies (68.7%). The results of the correlation test in the current study show that learning approaches significantly correlated with gender and skills, also only computer skills and year were significantly correlated with the preferences of the students of distance learning. We conducted a correlation analysis with the subscales of the questionnaire with the preference of the students of distance learning. The only significant one is the first item of the questionnaire. **Conclusion:** In conclusion, the results of this research show that students in a PBL school adopt a deep learning approach. Older students with good computer skills prefer online learning to face-to-face learning more than younger ones do. In addition, students prefer online learning to increase their satisfaction in their time of studying, and there is a significant relationship between their computer skills and the learning approach.

Keywords: Computer Skills, Learning Strategies, Medical Education, Problem-Based Learning (PBL)

1. Introduction

The approaches to learning have been studied extensively¹ the reason being that the quality of students' learning is influenced by the learning approach students adopt. In addition, the way students approach learning plays an important role in determining the outcome of any educational endeavor². In addition, the learning approaches of the students are thought to be influenced by the nature of the academic discipline. Students in medical institutions may have to learn approaches different from other higher education students³. The strategy that one adopts while searching for knowledge is known as the learning approach. The method a student follows to a learning context is not something that they are born with; rather, it is a skill or approach that they have learned that is based on the situation⁴. Hafsa and Ahmad⁵ defined learning approaches "as the individual differences in students' intentions when they are faced with a learning task and these reflect the strategies

an individual uses to acquire a particular goal". The concept of surface versus deep learning parallels the development of learner-centred learning^{6,7}. In the mid-seventies, learning approaches have been classified as deep and surface learning students that adopt a deep approach are typically driven by a desire to learn for the sake of learning and a passion for the subject matter. They make an effort to comprehend the underlying framework and meaning, critically evaluate the evidence, use it sparingly, and actively connect new information to what they already know¹. A surface learning approach has been defined as an intention to reproduce content using rote learning and memorization. A deep learning approach has been defined as an intention to understand content by looking for underlying principles together with relating ideas and critiquing knowledge as a learning process⁶.

A deep approach to studying is widely accepted to be associated with long-term success in undergraduate study. It is anticipated that these positive outcomes might extend beyond

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medical school, contributing to the development of doctors who display desirable approaches to self-directed learning and studying in medical practice⁸. Students who adopt a surface approach are required to learn vast quantities of information in a limited period; they generally tend to learn superficially by memorizing the facts without any concern for linking or integrating prior and new knowledge or fully understanding underlying mechanisms and principles⁹. Most often, students are driven by a desire to simply finish the course or a fear of failure¹. Medical students have, unfortunately, been shown to score highly for surface learning¹⁰. It was suggested that assessment drove them in this direction¹¹. Medical students are known to commonly concentrate their learning on topics that will help them pass exams, and they are also known to use a variety of study methods and tools to get ready for their exams¹². Surface learning and deep learning are not mutually exclusive and the two can coexist. Which type of learning the learners will pursue very much depends on the prior educational experiences of the learners and the nature of the educational tasks⁶. The learning approaches of students are influenced by several factors, such as teaching characteristics, departmental characteristics, and assessment methods¹³. Approaches reflect both individual preference plus the contextual variability arising from student perceptions of teaching and assessment characteristics, and may therefore change markedly over time⁸. The teachers also play a vital role in the decision process by determining the nature of the tasks and setting up their expectations of the students⁶. The learning approach is also influenced by the learning environment¹⁴. Student Learning theorists have argued that approaches to learning are at least in part a function of the teaching and learning environment rather than being “pure” individual differences. Good constructive alignment between teaching and learning activities, assessments, and desired learning outcomes is therefore required if desirable approaches are to be promoted and undesired approaches minimized⁷. Innovative medical school curricula promote teaching and assessment methods that encourage students to adopt the desired deep approaches⁸. Students in Problem-Based Learning (PBL) curricula are more probable to adopt a predominantly deep-learning approach to study. That is, intrinsic interest like the problem motivates students to develop a comprehensive understanding of all of the elements required for its solution¹⁵. If appropriate efforts were made to foster that change, learning approaches might evolve over a medical degree program's many years. To intervene, create a more conducive learning environment to enhance student learning, and better prepare them for the future, educators must have a comprehensive understanding of the dominant learning approaches and how the various demographic factors may influence the learning approaches of

medical students⁴. The World Health Organization on January 30, 2020, declared COVID-19 to be a global health emergency¹⁶. In these special circumstances, the COVID-19 pandemic has presented medical institutions, that strive to provide quality instruction to students virtually, with unprecedented difficulty⁵. Although online teaching approaches are not uncommon in medical schools, they have only been applied to particular components of the teaching process up to this point because of the COVID-19 pandemic and physical distance which have had such a significant impact¹⁷. For undergraduate medical students, educational resources have quickly increased during the past ten years. At the moment, it consists of both traditional and or online learning aids, such as textbooks, lectures, and tutorials. The concept of “blended learning”, which refers to this combination of approaches, is already well-established¹⁷. The preferences of students for online or face-to-face learning for various reasons have only been somewhat studied. Because it allowed them to study at home at their own pace and convenience and provided well-structured learning resources, students preferred online learning. They preferred face-to-face instruction for other reasons as well, such as developing their motor skills and building relationships with others. According to, switching completely to online mode may not be a viable choice for courses that are more practical or skill-oriented, and such institutions should instead construct a hybrid or blended curriculum using both face-to-face and online methods¹⁸. There is scant research discussing the relationship between online learning and its impact on superficial/deep learning. We are aiming in this study to enhance the quality of medical education by determining the learning approach of undergraduate medical students at the Faculty of Medicine, Suez Canal University in Ismailia, Egypt, which adopted PBL as an educational strategy. In addition, we will determine if the approach is correlated with the preference for online learning. This helps us to be more oriented about the provided tasks of learning for students. So, the objective of this study is to explore the learning approaches of students and their relationship with the student's preference for online learning.

2. Materials and Methods

2.1 Study Design

The study was a descriptive, cross-sectional one.

2.2 Study Setting

The study was conducted at the Faculty of Medicine, Suez Canal University in Ismailia, Egypt during the academic year 2021-2022.

2.3 Participants

A stratified random sample was used in the study, Random samples from the students in preclinical years including the 1st, 2nd and 3rd years participated in the study. The link to the online questionnaire was distributed using the online groups created by the coordinators and the administrators of the phases. Completion of the questionnaires denoted the participants' consent to participate in the study.

The probability sample size for a finite population was calculated by using confidence interval=95%, absolute precision of estimate=5% and prevalence rate of the superficial learning approach among the students was 22%¹⁹ so, the minimum sample size required was estimated to be 264.

According to the estimated sample size, the number of students that were taken from each year is: 115 from year 1, 108 from year 2 and 77 from year 3. All the responses were included and the total sample size was = 300 students.

2.4 Tools for Data Collection

The instrument used for data collection was named “a Two-Factor Study Process Questionnaire (R-SPQ-2F)” (Arabic Version) (20). The R-SPQ-2F is an Arabic version questionnaire used by teachers to assess students' different learning approaches. An exploratory factor analysis was previously conducted and showed two components. They were like the main scales of the English version. The main two scales are the deep and superficial approach and three subscales. The internal consistency was 0.8²⁰.

The questionnaire includes 20 items that evaluate the deep and surface learning approaches. To evaluate the learning approaches, a five-point Likert scale is used (1 = “the item is never or only rarely true of me” to 5 = “the item is always or almost always true of me”). It was transformed into an online form through Google Forms. We also asked the students if they prefer online or face-to-face learning and if they have sufficient computer skills. The questionnaire was piloted in a sample of students to establish its comprehensiveness and appropriateness.

2.5 Data Analysis

As for the analysis of data, information was presented in tabular forms. For quantitative data, the analysis was performed using the Statistical Package for the Social Sciences (SPSS version 26). Data first was tested for being or not normally distributed. According to the type of data, the following was used: Descriptive analysis; calculating the mean, median and mode. Spearman's rho for testing correlation. Analysis of the p-value will be set at <0.05 for significant results.

2.6 Ethical Approval

Ethical approval was obtained from the Research and Ethics Committee of the Faculty of Medicine, Suez Canal University, Ismailia, Egypt (REF No: 5042).

3. Results

The Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) was collected from 300 students in a PBL program, divided as follows: 115 students from the first year, 108 students from the second year, and 77 students from the third year. There are 147 males and 153 females (Table 1).

The students mostly adopt deep learning strategies (72.3%) compared to superficial learning strategies (27.7%) as shown in Table 2.

The females mostly adopt deep learning strategies (75.8%) compared to males who adopted deep learning strategies (68.7%) as shown in Table 3.

Table 1. Gender distribution

	Frequency	Per cent
Males	147	49.0
Female	153	51.0
Total	300	100.0

Table 2. Frequency of learning approaches in the whole sample

	Frequency	Per cent	Cumulative Per cent
Superficial	83	27.7	27.7
deep	217	72.3	100.0
Total	300	100.0	

Table 3. Frequency of learning approaches among males and females

		Gender	Frequency	Per cent
1	males	superficial	46	31.3
		deep	101	68.7
		Total	147	100.0
2	females	superficial	37	24.2
		deep	116	75.8
		Total	153	100.0

The learning approaches significantly correlated with gender and skills (Tables 4 and 5). As shown in Table 6, Only computer skills and year were significantly correlated with the preferences of the students of distance learning.

Table 4. Correlation of learning approaches with gender

		Superficial	Deep
Gender	Pearson Correlation	-.266**	-.064
	Sig. (2-tailed)	.000	.266
	N	300	300

Table 5. Correlation of learning approaches with computer skills

		Deep	
Spearman's rho	Skills	Correlation Coefficient	.125*
		Sig. (2-tailed)	.031
		N	300

We conducted a correlation analysis with the subscales of the questionnaire with the preference of the students of distance learning. The only significant one is the first item of the questionnaire as shown in Table 7.

4. Discussion

During the COVID pandemic, online teaching is very effective and encourages educational institutions to improve their resources²¹. A well-structured and organized e-courses increase student satisfaction and show high levels of performance and increase knowledge accumulation when compared with

traditional learning²². In the current study, data were collected by a self-administered questionnaire titled Revised Two Factor Study Process Questionnaire (R-SPQ2F) Arabic version²⁰. In this study, the students mostly adopt deep learning strategies (72.3%) compared to superficial learning strategies (27.7 %). Because our students learn by PBL strategy which enhances active learning and self-directed learning. Hence the intrinsic motivation of the students will be enhanced and thus enhance deep learning. In addition, the students practice less workload and more assessment that encourage deep learning and inhibit superficial learning.

These results were supported by a comparable study²³, which shows that students decrease using the surface approach and increase using the deep learning approach to enhance their level of success. A similar study by Senemoğlu, 2011²⁴, reported that Turkish and American students who adopt deep and strategic learning approaches, perceived themselves to be successful whereas students who thought they were less successful used surface learning approaches in both countries. This finding is also in line with the results of a study Measuring the learning approach to problem-based learning in first-year and second-year students revealed that they adopt a deep approach rather than a surface approach²⁵. Another study demonstrated that PBL students tend to adopt a deeper approach rather than a surface approach to learning²⁶. Similarly, a study by Reid, *et al.*,²⁷ noted that early medical students have high scores for deep and strategic approaches to learning and lower scores for a surface approach. Also, a study by Emilia²⁸, for learning approaches in classroom settings shows that more students are using the deep approach than the surface approach. In opposite to the study by Jürgens *et al.*,² for studying skills, students tend to adopt surface learning more

Table 6. Correlation of preference for distance learning with year, learning strategies and skills

		Year	Superficial	Deep	Preference	Skills	
Spearman's rho	preference	Correlation Coefficient	-.135*	.081	-.016	1.000	.266**
		Sig. (2-tailed)	.019	.160	.788	.	.000
		N	300	300	300	300	300

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 7. Correlation of preference of distance learning with item 1 in the questionnaire

		1- "I find that at times studying gives me a feeling of deep personal satisfaction"	
Spearman's rho	preference	Correlation Coefficient	0.135*
		Sig. (2-tailed)	.019
		N	300

*Correlation is significant at the 0.05 level (2-tailed).

than deep learning maybe due to overloaded curriculum and activities which tend to impose the use of surface learning than deep learning. The current study shows that females mostly adopt deep learning strategies (75.8%) compared to males who adopted deep learning strategies (68.7%). Several studies²⁹⁻³¹ are consistent with this research in founding that female students had a higher score overall on the clinical performance examination than male students. This is similar also to the findings by Boulet *et al.*,³² who reported that female students scored better than their male counterparts overall, and in the specific area of interpersonal skills. Another study also shows that female students chose the strategic approach more often than males³³. The results of the correlation test in the current study show that learning approaches significantly correlated with gender and skills, also only computer skills and year were significantly correlated with the preferences of the students of distance learning. This is a contradictory finding to that of Subasinghe *et al.*,³⁴ which shows that gender did not show a significant effect on selecting the approach since more or less equal proportions of males and females were included in both approaches except for a very slight female predominance. The best and most practical strategy to maintain or even raise the teaching standard is to combine the benefits of traditional and online learning to enhance medical instruction and the student experience, based on evidence from “blended teaching,” as supported by Dodiya *et al.* In another study surface approach correlates positively with all six items of the Motivated Strategies for Learning Questionnaire. The deep approach also correlates positively with all items of the questionnaire except control of learning beliefs has a negative correlation². In another study by Demir *et al.*,³⁶ on a postgraduate fined a positive and significant relationship was found between readiness for online learning and perceived interaction. In addition, a negative and significant relationship was found between structure and readiness for online learning and interaction.

5. Limitations

The use of a single institution limits the representativeness of this study for the entire population of medical students. A sample of students from year 1,2,3 was used. Therefore, the sample may have been biased and might not represent the population of medical students.

6. Conclusion

In conclusion, the results of this research show that students in a PBL school adopt a deep learning approach. Older students with good computer skills prefer online learning to face-to-

face learning more than younger ones do. In addition, students prefer online learning to increase their satisfaction in their time of study, and there is a significant relationship between their computer skills and the learning approach.

7. References

1. Emilia O, Bloomfield L, Rotem A. Measuring students' approaches to learning in different clinical rotations BMC Medical Education. 2012; 12:114. <https://doi.org/10.1186/1472-6920-12-114> PMID:23153333 PMCID:PMC3527326
2. Jürgens S, Emilia O, Widyandana. Relationship between learning approach and motivation to learn among medical students at Universitas Gadjah Mada. Journal of Medical Education and Health Professions. 2009; 4:1.
3. May W, Chung E, Elliott D, Fisher D. The relationship between medical students' learning approaches and performance on a summative high-stakes clinical performance examination. Medical Teacher. 2012; 34:236-41. <https://doi.org/10.3109/0142159X.2012.652995> PMID:22455715
4. Chonkar SP. The predominant learning approaches of medical students. BMC Medical Education. 2018; 18(1): 1-8. <https://doi.org/10.1186/s12909-018-1122-5> PMID:29347934 PMCID:PMC5774125
5. Inayat H, Ahmad Z. Effect of learning approaches on student's academic achievement. Recent Advances in Statistics. 2011; 295.
6. Dolmans DHJM, Loyens SMM, Marcq H, Gijbels D. Deep and surface learning in problem-based learning: A review of the literature. Adv Health Sci Educ Theory Pract. 2016 Dec; 21(5):1087-1112. <https://doi.org/10.1007/s10459-015-9645-6> PMID:26563722 PMCID:PMC5119847
7. Amin Z, Khoo E. Basics in medical education. Teaching and learning concepts. World Scientific Publishing Co. Pte. Ltd; 2003. p. 28-34.
8. Mattick K, Dennis I, Bligh J. Approaches to learning and studying in medical students: Validation of a revised inventory and its relation to student characteristics and performance Medical Education. 2004; 38(5): 535-43. <https://doi.org/10.1111/j.1365-2929.2004.01836.x> PMID:15107087
9. Gurpinar E, Kulac E, Tetik C, Akdogan I, Mamakli SS. Do learning approaches of medical students affect their satisfaction with problem-based learning? Advan in Physiol Edu. 2013; 37:85-8. <https://doi.org/10.1152/advan.00119.2012> PMID:23471254
10. Reid W, Duvall E, Evans P. Can we influence medical students' approaches to learning? Medical Teacher. 2005; 27(5):401-7. <https://doi.org/10.1080/01421590500136410> PMID:16147792
11. Reid W, Duvall E, Evans P. Relationship between assessment results and approaches to learning and studying in year two medical students. Medical Education. 2007; 41:754-62. <https://doi.org/10.1111/j.1365-2923.2007.02801.x> PMID:17661883
12. Zhang J, Peterson R, Ozolins L. Student approaches for learning in medicine: What does it tell us about the infor-

- mal curriculum? *BMC Medical Education*. 2011; 11:87. <https://doi.org/10.1186/1472-6920-11-87> PMID:22013994 PMCid:PMC3209448
13. Abraham RR, Vinod P, Kamath M, Asha K, Ramnarayan K. Learning approaches of undergraduate medical students to physiology in a non-PBL- and partially PBL-oriented curriculum. *Adv Physiol Educ*. 2008; 32(1): 35-7. <https://doi.org/10.1152/advan.00063.2007> PMID:18334566
 14. Reid W, Evans P, and Duvall E. Medical students' approaches to learning over a full degree programme. *Med Educ*. 2012; 17:10. <https://doi.org/10.3402/meo.v17i0.17205> PMID:22927717 PMCid:PMC3427928
 15. Groves M. Problem-based learning and learning approach: Is there a relationship? *Advances in Health Sciences Education*. 2005; 10:315-26. <https://doi.org/10.1007/s10459-005-8556-3> PMID:16362620
 16. Wilcha R. Effectiveness of virtual medical teaching during the COVID-19 Crisis: Systematic review. *JMIR Med Educ*. 2020; 6(2):e20963 <https://doi.org/10.2196/20963> PMID:33106227 PMCid:PMC7682786
 17. AlQhtani A, AlSwedan N, Almulhim A, Aladwan R, Alessa Y, AlQhtani K, Aldhafian O. Online versus classroom teaching for medical students during COVID-19: Measuring effectiveness and satisfaction. *BMC Med Educ*. 2021; 21:452. <https://doi.org/10.1186/s12909-021-02888-1> PMID:34454493 PMCid:PMC8397601
 18. Atwa H, Shehata MH, Al-Ansari A, Kumar A, Jaradat A, Ahmed J, Deifalla A. Online, face-to-face, or blended learning? faculty and medical students' perceptions during the COVID-19 Pandemic: A mixed-method study. *Front Med*. 2022; 9:791352. <https://doi.org/10.3389/fmed.2022.791352> PMID:35186989 PMCid:PMC8850343
 19. Liew SC, Sidhu J, Barua A. The relationship between learning preferences (styles and approaches) and learning outcomes among pre-clinical undergraduate medical students. *BMC Med Educ*. 2015; 15:44. <https://doi.org/10.1186/s12909-015-0327-0> PMID:25889887 PMCid:PMC4414371
 20. Munshi FM, Al Rukban MO, Al-Hoqail I. Reliability and validity of an Arabic version of the revised two factor study process questionnaire R-SPQ-2F. *J Fam Community Med*. 2012; 19:33-7. <https://doi.org/10.4103/2230-8229.94010> PMID:22518356 PMCid:PMC3326768
 21. Wilcha RJ. Effectiveness of virtual medical teaching during the COVID-19 Crisis: Systematic review. *JMIR Med Educ*. 2020; 6(2):e20963. <https://doi.org/10.2196/20963> PMID:33106227 PMCid:PMC7682786
 22. Schimming LM. Measuring medical student preference: A comparison of classroom versus online instruction for teaching *PubMed*. *J Med Libr Assoc*. 2008; 96(3):217-22. <https://doi.org/10.3163/1536-5050.96.3.007> PMID:18654658 PMCid:PMC2479068
 23. Beyaztaş Dİ, Senemoğlu N. Learning approaches of successful students and factors affecting their learning approaches. *Education and Science*. 2015; 40(179):193-216. <https://doi.org/10.15390/EB.2015.4214>
 24. Senemoğlu N. College of education students' approaches to learning and study skills. *Eğitim ve Bilim*. 2011; 36(160):65-80.
 25. Dolmans DH, Wolfhagen IH, Ginns P. Measuring approaches to learning in a problem-based learning context. *International Journal of Medical Education*. 2010; 1. <https://doi.org/10.5116/ijme.4c50.b666>
 26. Groves M. Problem-based learning and learning approach: Is there a relationship? *Adv Health Sci Educ Theory Pract*. 2005; 10(4):315-26. <https://doi.org/10.1007/s10459-005-8556-3> PMID:16362620
 27. Reid WA, Duvall E, Evans P. Can we influence medical students' approaches to learning? *Medical Teacher*. 2005; 27(5):401-7. <https://doi.org/10.1080/01421590500136410> PMID:16147792
 28. Emilia O. Students' approach to learning. *Jurnal Pendidikan Kedokteran dan Profesi Kesehatan Indonesia*. 2006; 1(2):42-9.
 29. Martin IG, Stark P, Jolly B. Benefiting from clinical experience: The influence of learning style and clinical experience on performance in an undergraduate objective structured clinical examination. *Med Educ*. 2000; 34:530-4. <https://doi.org/10.1046/j.1365-2923.2000.00489.x> PMID:10886635
 30. Haist SA, Witzke DB, Quinlivan S, Murphy-Spencer A, Wilson JF. Clinical skills as demonstrated by a comprehensive clinical performance examination: Who performs better - men or women? *Adv Health Sci Ed*. 2003; 8:189-99. <https://doi.org/10.1023/A:1026072102739> PMID:14574044
 31. Haq I, Higham J, Morris R, Dacre J. Effect of ethnicity and gender on performance in undergraduate medical examinations. *Med Educ*. 2005; 39:1126-8. <https://doi.org/10.1111/j.1365-2929.2005.02319.x> PMID:16262808
 32. Boulet JR, Van Zanten M, McKinley DW. Correlates of performance of the ECFMG clinical skills assessment: Influences of candidate characteristics on performance. *Acad Med*. 2003; 78:S72-4. <https://doi.org/10.1097/00001888-200310001-00023> PMID:14557101
 33. May W, Chung EK, Elliott D, Fisher D. The relationship between medical students' learning approaches and performance on a summative high-stakes clinical performance examination. *Medical Teacher*. 2012; 34(4):e236-41. <https://doi.org/10.3109/0142159X.2012.652995> PMID:22455715
 34. Subasinghe SD, Wanniachchi DN. Approach to learning and the academic performance of a group of medical students- any correlation. *Stud Med J*. 2009; 3(1):5-10.
 35. Dodiya D, Vadasmiya D, Diwan J. A comparative study of flip classroom teaching method versus traditional classroom teaching method in undergraduate medical students in physiology. *Natl J Physiol Pharm Pharmacol*. 2019; 9:551-5. <https://doi.org/10.5455/njppp.2019.9.0310829032019>
 36. Demir Kaymak Z, Horzum MB. Relationship between online learning readiness and structure and interaction of online learning students. *Educational Sciences: Theory and Practice*. 2013; 13(3):1792-7.