

# The Effect of Virtual Education with a Problem-Based Approach Using Virtual-Small Groups on Academic Achievement and Participatory Learning in Midwifery Students of Islamic Azad University, Jahrom Branch, Iran

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## Abstract

**Background:** The formation of small groups and education with an active learning approach is among the basics of problem-based learning (PBL).

**Objectives:** The present study aimed at determining the effect of the PBL approach with virtual-small groups on academic achievement and participatory learning in midwifery students of Islamic Azad University, Jahrom Branch, Iran.

**Methods:** The present interventional study was performed on 50 midwifery students of Islamic Azad University, Jahrom Branch, studying at internal and gynecologic surgery course in the academic year of 2018-19. The subjects were randomly assigned to the intervention and control groups. The intervention and control groups underwent PBL and the conventional methods, respectively. The academic success of the participants and the active and collaborative learning was assessed. Data were analyzed using the Mann-Whitney U and Wilcoxon tests in SPSS.

**Results:** There was a significant increase in the mean score of academic achievement in the intervention group compared to controls ( $P < 0.05$ ). The active and collaborative learning (ACL) score of the intervention group was above average and significantly higher compared to the control group ( $P = 0.03$ ).

**Conclusion:** PBL virtual with small groups, in addition to academic success, affects ACL. This technology can be used for educational purposes, such as participation and interaction in small groups in the PBL.

**Keywords:** Virtual Education, Problem-based Education, Academic Success, Active and Collaborative Learning

## Background

Virtual learning environments (VLE) allow teachers and learners to form their learning communities. In such environments, teachers and learners communicate via computers using the words and images shared (1). Lecturing is currently considered the dominant teaching method used by teachers in VLE. Although electronic (e)-learning supports and even boosts existing methods, such as lecturing (2), problem-based learning (PBL) is one of the most active student-centered teaching techniques through which students form small groups and are triggered to learn through the search for resources and group interaction; learning occurs as a result while they

try to analyze the problem. In fact, the scientific situation is provided by designing a scenario for the learners as problems, which they should strive to solve by searching for evidence and sources, group analysis, and ensemble reflection (3, 4).

Social media is popular for students to share information and knowledge and express their feelings. These networks enable students to exchange videos, text messages, images, and knowledge. They also allow students to improve their educational processes, which in turn increases ensemble knowledge (5). The use of social networks only for entertainment and recreation and non-educational and academic purposes adversely affect

students' academic achievement and, consequently, lead to low grades (3).

Using virtual-small groups in VLEs facilitates the application of the PBL approach. Virtual networks operate based on online community formation, bringing Internet users with common interests or characteristics together. Such networks are a kind of social media, enabling a new way of communication and information share on the Internet (6).

Although social media may have a negative impact on students nonetheless, they can serve as a useful resource if used appropriately (5).

Many pieces of research are conducted on the utilization of PBL in training medical students. Likewise, Kojouri et al., in a study on the effectiveness of collaborative learning in PBL, concluded that it could be implemented in small groups (7). The study by Nouhi et al. on participatory learning experiences using PBL in nursing students showed that considering a wide range of intrinsic and extrinsic concepts, dimensions, factors, and conditions affecting PBL and benefits, it can play a pivotal role in nursing education system. Also, their results indicated the lack of skills required for applying PBL (8). Active learning cannot be guaranteed only by lecturing and one-way communication in e-learning. The use of the PBL approach forms a multidimensional communication between students and the teacher. Under such circumstances, where the formation of face-to-face groups is not possible or faced with various problems of time and space coordination, the use of small groups in the virtual network provides the opportunity of a wide range of activities for group members to achieve academic goals.

### Objectives

The present study aimed at determining the effect of the PBL approach with virtual-small groups on academic achievement and active and collaborative learning (ACL) in midwifery students of Islamic Azad University, Jahrom Branch, Iran.

### Methods

An interventional study was performed on 50 midwifery students who were studying at internal and gynecologic surgery course in the second semester of the academic year 2018-19 at the Islamic Azad University, Jahrom Branch. The subjects were entered into the study by census method and randomly assigned to the intervention and control groups based on the list of students ( $n=25$  in each group).

The data collection instrument contained demographic information, including age, gender, marital status, nativity status, and total grade point average (GPA). Also, two questionnaires were used for evaluating academic success and Active Collaborative Learning (ACL). The questionnaire used to evaluate students' academic success contained 20 items on internal and gynecologic surgery contents and its score ranged from zero to 20. Using the Koder-Richardson reliability (KR20) formula, the

internal consistency of the questionnaire was evaluated. The reliability of it was calculated as 0.9 which was obtained using pretest and posttest in both groups. Before the intervention, the questionnaire was distributed among the subjects. Then, both groups were retested simultaneously after six weeks.

Active and Collaborative Learning (ACL) was assessed using the National Survey of Student Engagement (NSSE). This seven-item scale is scored based on a five-point Likert scale (from very high (5) to very low (1), and its total score ranges from 7 to 35. The reliability of NSSE was assessed by Cronbach's alpha coefficient ( $\alpha=0.7$ ), and its validity by the content and face validity (9).

First, the study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences, and a letter of introduction was obtained from the university to submit to the Islamic Azad University, Jahrom Branch. The research team attempted to collect data from the intervention and control groups using trained individuals. First of all, a pretest was taken from both groups based on their baseline knowledge. Also, the ACL questionnaire was distributed among the participants in both groups, and their scores were calculated. The training was provided for the intervention group using the PBL approach, but it was lecturing in the control group. The educational topic in both groups was preeclampsia and placental abruption. For this purpose, the educational content in the control group was provided as virtual for three weeks by lecturing.

Second, the training program was performed online in the intervention group in the same period of three weeks, using the five-step modified PBL method (MPBL), by forming virtual-small groups. The intervention group was divided into three small Internet-based (WhatsApp) subgroups ( $n=7$  in each). In the MPBL implementation, The researcher was with the students as a facilitator. The educational content was provided to the students as a scenario in the form of a story. After interacting, determining, and extracting the educational goals under the guidance of the teacher, the groups were given one week to search, gather information, and study individually on the goals. The next step was presentation and group discussion, summarizing, presenting electronic content and video clips on educational topics. Finally, the post-test on the educational content was taken simultaneously in both groups. The ACL questionnaire was also distributed in both groups. The mean scores of academic achievement and ACL in both groups, before and after the intervention, were analyzed in SPSS version 20 (IBM Corporation, Armonk, NY).

In addition to teaching method differences in the control and intervention groups, since first the control group (first half of the semester) and then the intervention group (second half of the semester) received training, the possibility of information exchange and contact between the group was minimized. Besides, virtual-small groups were formed by the researcher in the intervention group, and the possibility of adding more members were controlled. According to the results of the Kolmogorov-

Smirnov test, the data had non-normal distribution. The Wilcoxon and Mann-Whitney U tests were used for inter and intragroup comparisons in SPSS version 20.

## Results

In total, 50 midwifery students of Islamic Azad University, Jahrom Branch, studying at internal and gynecologic surgery course, participated in the present study. The mean age of students was 21.43 years, and all were female.

Table 1 shows the demographic characteristics of the participants. Accordingly, there was no significant difference between the intervention and control groups in terms of demographic variables ( $P > 0.05$ ).

Before the intervention, there were no significant differences in the academic success scores between the intervention and control groups ( $P = 0.28$ ), indicating the homogeneity of the groups (Table 2). A comparison of the mean score of academic success in both intervention and control groups before and after the intervention showed that the learning score in the intervention group was significantly higher than that of the control group ( $P = 0.02$ ).

The results indicated a significant increase in the mean score of ACL in the intervention group at a 95% confidence interval level ( $P < 0.05$ ) (Table 2).

The posttest ACL score was  $31.83 \pm 4.94$  in the intervention group, which was higher than the average (17.5) and significantly higher than the score ( $24.30 \pm 3.60$ ) in the control group.

## Discussion

Ensemble learning and activity in small groups is an important part of learning in the PBL approach. The learning process starts with posing a problem, and learners

in 5-10 groups acquire the knowledge needed to solve it through working on it. The teacher also plays a role as a facilitator in the learning process. In this method, gaining knowledge and the result of working on the problem are substantial (10).

The present study aimed at determining the effectiveness of e-learning with the PBL approach using virtual small groups in two variables of academic achievement and ACL in students. The results showed a significant increase in the mean learning score (academic success) of the intervention group. Likewise, the study by Saeedinejat and Vafaei Najjar showed that distance education programs were effective in the academic success of the intervention group (11). In a study on the effect of social media on the academic achievement of engineering students of Maiduguri University, Borno State, Nigeria, Fori concluded that social media sites do not affect academic performance (12). Likewise, Madaiah et al., in a study on medical students, reported that those who used virtual social networks had lower academic performance than their peers who did not (13). This difference could be expected due to the non-purposeful use of virtual networks related to educational content in the present study.

In the present study, the mean posttest ACL score was significantly higher in the intervention group than the controls, so that there was a significant difference in active and collaborative learning in students undergoing the PBL approach with virtual-small groups. Brindley et al., in research conducted by the University of Maryland College and the University of Oldenburg, aiming at creating effective groups of online educational collaboration (15 groups) in the basic sciences course in distance learning program reported that the online classrooms could make a significant difference in student collaboration with group learning projects through whole-class or small groups

**Table 1.** Comparison of Demographic Characteristics of the Study Groups

Variable		Intervention	Control	P
Age (yr.), Mean±SD		21.14 ± 2.76	21.72 ± 23.58	0.70
Marital status(N)	Single	17	19	0.83
	Married	4	6	
Place of residence(N)	Native	13	14	0.82
	Non-native	11	8	

**Table 2.** Comparison of the Mean Scores of Academic Success and Active and Collaborative Learning based on the groups and time of the assessment in Midwifery Students of Islamic Azad University, Jahrom Branch

	Intervention (n=25) Mean±SD	Control (N=25) Mean±SD	t*	P
Academic success score (Pre-test)	11.0 ± 3.26	12.0 ± 6.99	258.5	0.28
Academic success score (Post-test)	18.0 ± 2.17	14.0 ± 5.68	125.5	0.02
Active and collaborative learning score (Pre-test)	13.26 ± 3.41	14.22 ± 3.52	222.1	0.22
Active and collaborative learning score (Post-test)	31.83 ± 4.94	24.30 ± 3.60	156.5	0.03
Active and collaborative learning score in the intervention group	Pre-test	13.26 ± 3.41	-941.1	0.04
	Post-test	31.83 ± 4.94		

discussions (14).

The study by Akbari Bourang et al., on the quality of e-learning in Iranian universities, based on curriculum orientations and teachers' experiences, showed a significant relationship between e-learning experience and e-learning quality in paying attention to personal differences, facilitating cooperation between students, providing feedback, and evaluation (15).

Nohi et al., in a research on collaborative learning experiences on PBL in nursing students, concluded that there was a wide range of intrinsic and extrinsic concepts, dimensions, factors, and conditions affecting PBL, which considering the advantages of this approach, can play a pivotal role in the nursing education system. They also highlighted that the lack of skills required performing MPBL (8).

In other studies, aimed at making the PBL method more efficient, it was combined with Internet technology for web-based education of computer games and various computer programs, and compared to controls receiving PBL in the classroom, the intervention group undergoing a combination of PBL and computer technology had better performance (17, 16).

The results of the research show that assigning students to small groups using the PBL approach can be very effective because it is a student-centered method, and its success is relied on student activity, teamwork, information exchange, training problem-solving skills, and critical thinking (7).

Baghcheghi et al., comparing collaborative and traditional learning methods in terms of communication skills of nursing students, concluded that collaborative learning is an effective method to improve and enhance communication skills in nursing students, especially the interactive ones (18).

Ganji and Tavakoli concluded that due to the role of Internet addiction in academic motivation, its usage if not managed might be associated with negative consequences, such as decreased academic motivation (19). The facilitator role of the teacher, providing the ground for more interaction between the teacher and the student, the active collaboration of students through self-directed learning, and group collaboration in virtual learning are emphasized by experts (20-23, 8, 5). The use of the PBL method, while maintaining the role of the teacher in virtual education, provides good educational opportunities for most students to work with virtual-small groups and increase ensemble knowledge. The utilization of social networks is popular among students to share information, knowledge, and also express their feelings. They also enable students to exchange videos, text messages, images, and knowledge (2).

The idea of using social software in e-learning with common features such as decentralization, ease of interface design, interactive nature, content production with the active collaboration of user, and greater transparency in information circulation, triggered new advancements in e-learning (20, 23). On the other hand, the use of social

networks as entertainment and recreational applications, in non-educational and academic ways, by students can have negative impacts on their academic achievement (3). Therefore, the directed application of this technology in the curriculum to increase the collective synergy and control its negative consequences is essential.

### Conclusion

The use of the PBL approach in virtual-small groups, in addition to academic success, affects the active collaboration of students. Based on the obtained results, the use of virtual small groups in PBL, use of modern technologies in virtual networks through searching for content, and engaging students in analyzing the problem through facilitating group interaction can persuade students to more collaborative education and improve their knowledge and abilities.

Although the sample size was small and attempts were made to control information exchange between groups, they were the limitations of the present study. It is recommended to perform similar research in larger sample sizes.

### Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open [http://sdme.kmu.ac.ir/jufile?ar\\_sfile=804875](http://sdme.kmu.ac.ir/jufile?ar_sfile=804875)]

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