Effect of the Blended Workshop Learning and Web-Based Learning Order and Sequence on the Interest Level: (Spiritual Effectiveness) Factor Analysis

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Abstract- The well-known blended electronic learning system has been seen so far from the point of view of comparison with other e-learning, but not much research has been done about educational planning, in terms of students' interest in how to organize the combined face-to-face and non-face-to-face implementation of this type of educational method. The present study is an assessment with the aim of comparing the effect of the combined implementation sequence of two methods of blended web-based and workshop learning on the level of interest of students who are members of the research committee of Arak University of Medical Sciences to participate in the Vital Statistics course. This is a quasi-experimental study with an alternative treatment design. The statistical population, who were selected through census sampling due to limited numbers, included 38 students of the Faculty of Medicine and 15 students of the Faculty of Health. The data collection tool included two questionnaires of demographic characteristics and an interesting questionnaire. The validity of the interest questionnaire was assessed through content validity and factor analysis, and its reliability was by calculating Cronbach's alpha coefficient. The data were analyzed in SPSS-16 through independent t-tests, Keyser's index, Bartlett's test, and Cronbach's alpha coefficient. The results showed a statistical difference between interest in the first group (A: Workshop/Web-based) and the second group (B: Web-based/Workshop) in blended learning: In the medical faculty ($P=0.043$), in the health faculty ($P=0.051$) and the total of two faculties ($P=0.004$). Given the statistical difference observed in conditions (Comparison of groups in each faculty independently and comparison of groups in total of two faculties), we suggest holding Workshop (in-person) courses at first and online courses then.
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Acta Med Iran 2024;62(November-December):368-376.

Keywords: E-learning; Workshop learning; Interest; Satisfaction; Attitude; Motivation; Blended learning; Factor analysis; Medical education

Introduction

Although the use of a student-centered approach has been favored in the classroom recently, the role of teachers in effective learning is essential. Creating a classroom environment where active participation is encouraged by the teacher helps students succeed academically. Student-centeredness enhances

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cooperative learning, develops problem-solving and decision-making skills, and stimulates reflective and critical thinking skills; however, the role of a teacher is not omitted in the classroom (1). The use of computers and other information and communication technology tools has led to the formation of a new type of communication between people, including educational interactions between students, professors, and educational content. But this training also has its limitations, including that it may not be able to replace the teacher, human and emotional interactions, and face-to-face communication that exists in the classroom (2). Blended learning represents the strengths of oral-written communications. Also, it provides a unique combination of synchronous and asynchronous communication in the form of a diverse set of face-to-face and virtual-learning activities. Undoubtedly, we know blended learning consists of using non-attendance and in-person training, which is effective (1,3,4). However, now we want to check whether the order and sequence are significant from the point of view of interest. It is so important to find the best educational method among all kinds of them and its relationship with the interest of learners because of: Wide community involved in medical education (including students, academic staff members, employees, etc.), the necessity of conducting short's term training courses, not the same time accessibility for new learning materials in kinds of learners, having different needs according to the diversity of the geographical and occupational situation, as well as paying attention to the subjects of medical training who are active in experimental fields. "Interest" is as loving and asking for it and loving with the heart, translated in Dehkhoda's dictionary (5). John Dewey, an American psychologist, is one of the first to study interest scientifically and conceptualize it. He believes interest is different from effort and leads to deeper learning. It arises when an activity is considered meaningful for a person, in other words, interest is more than a series of internal motivations and can be expressed in the form of a psychological state, a type of individual preparation, or a personality trait (6). Insorio Alvin Odon, quoted by Hidi and Renninger, defined interest as an intention to engage or have a predisposition to the content. Students' interest is essential to consider in choosing a college course. They found that students could acquire knowledge and skills in future careers and be aware of expectations, the learning environment, and the importance of what they learned in high school. Hence, students became more interested in their college and careers (7). Konrad reported that the

integration of virtual and face-to-face communication facilitates more flexibility in the media and mutual relations between student-student, student-teacher and student-content in both virtual and face-to-face environments along with benefits (8). Research results showed that blended learning allows professors to have a balanced presence in face-to-face and online classes, in such a way that online components naturally increase learning in traditional classes, which according to Martin, this causes access to the learning experience will be meaningful (9). Grayson and her colleagues have proposed a framework to guide and practice virtual learning, and the general nature of this framework, along with its effects in guiding understanding and designing blended learning environments, has been recognized as very effective (10). The research results showed that the combined education system has been able to attract the satisfaction of teachers and students in terms of applying flexibility in the learning process and the ability to take advantage of both face-to-face and electronic education methods. In order to be more successful in this field, more attention should be paid to the aspects of increasing interaction and a method of creating motivation in the e-learning section of combined education (11). In the survey of sequence in educational programs, the present study was a comparative study of the order of blended workshop learning and web-based learning on the level of interest (including the three components of motivation, attitude and satisfaction) on students who were members of the Research Committee of the Arak Medical Sciences University.

Materials and Methods

On an objective-based, this is a fundamental study of quasi-experimental type and alternative treatment design. The statistical population during the study included all students who were members of the student research committee of Arak University of Medical Sciences and who were willing to participate in the course. The number of volunteers in the Faculty of Health was 26 and in the Faculty of Medicine 41, who were divided into two equal groups by a simple random method in each faculty. 11 of the 26 volunteer students from the Health Faculty were excluded from the program due to the unscheduled meeting of the extraordinary mandatory class, and 3 of the 41 medical faculty volunteers were removed from the program due to not participating in the exams. These are shown in **Error! Reference source not found.**.
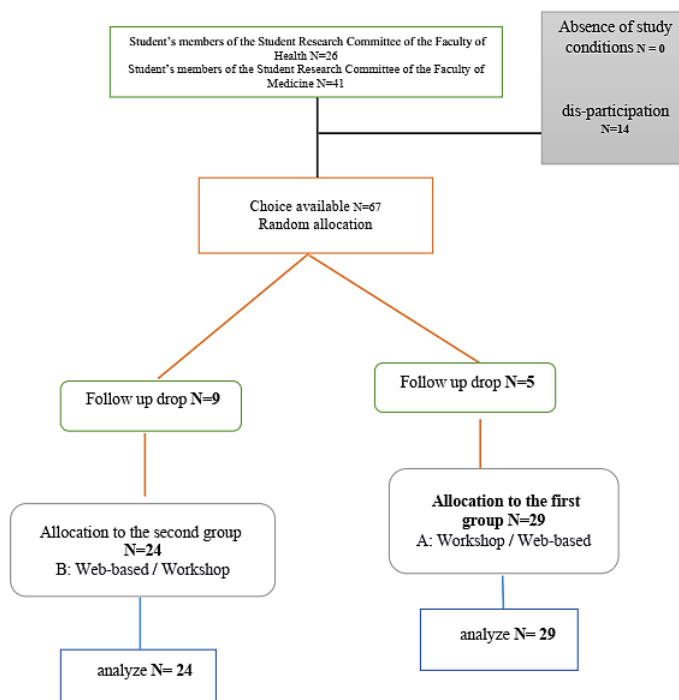
Chart 1. The stages of conducting the research census (consort diagram)

Study environment

The study was performed at Arak Medical Sciences University. The in-person workshop was held in the meeting hall, and the Internet was used for web-based education.

Instrument

The data-collection tool included two demographic information questionnaires and an interest questionnaire. The interest questionnaire was divided into three items: the first and second sub-sets each contained nine closed-ended questions graded on a 5-point Likert scale (completely agree, agree, no difference, disagree, completely disagree) to measure attitude and satisfaction, and the third consisted of 6 closed-ended questions graded on a 5-point Likert scale (from in all situations, to it never affects my motivation) to measure motivation. The content validity of the "interest" instrument has been evaluated by reading related books and articles and sending them to 5 experts through the Delphi technique. Also, the opinions of the supervisor and advisor and members of the research team were used for this stage. In this study, the agreement-based technique was used, which included the following 5 steps: 1- Determining the primary goal 2. Identification of experts 3. Sending questions 4. Analysis of responses 5. Re-review by experts and finalization. Also, the validity of the

instrument and its three items (attitude, motivation, satisfaction) were investigated by factor analysis method according to the adequacy of the number of data collected based on KMO and Bartlett's Test (Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0/820, Sig=0/000) (12).

The reliability of the instrument has been checked based on the value of Cronbach's alpha coefficient in SPSS version 16 software:

- 9 of 9 Questions with Cronbach's alpha 0.805 for variables of measuring Satisfaction**Error! Reference source not found.**

- 7 of 9 Questions with Cronbach's alpha 0.856 for variables of measuring Attitude

- 4 of 6 Questions with Cronbach's alpha 0.811 for variables of measuring Motivation

According to above in which all Cronbach's alpha are more than (0.7), reliability of the instrument is confirmed (12).

Inclusion and exclusion criteria

Inclusion criteria were a member of the Student Research Committee of Arak Medical Sciences University. An undergraduate level and above degree student that at least one semester passed in the relevant major is not a withdrawal student or graduated in another major than the present one. Students who did not attend the training courses or exams in full, as well as students

who had a vital statistics unit in their current semester, were excluded from the study.

Implementation method

11 students out of 26 eligible students were excluded from the Faculty of Health due to a concurrency of unpredicted extra classes and not attending the workshop; furthermore, out of 41 students in the Faculty of Medical, 3 students were excluded from the research community due to an absence from the tests. The groups were equally divided into 13 people in the Faculty of Health and 20 people in the Faculty of Medicine by a simple random method; after the removal of the exited participants, in the health faculty remained two groups of 8 and 7 people, and in the medical faculty two groups of 17 and 21 people. An educational session was held before the beginning of the study to introduce the web-based environment to the

groups, a written consent during that was also obtained. The students in both groups received an education based on the usual (in-person) workshop learning approach (first group) and based on the web-based e-learning approach (second group) in the first session and based on web-based e-learning approach (first group) and the traditional workshop learning approach (second group) in the second session. The site learning environment was managed with the "Open Meetings" open-source software. This study compared "Interest" on the sequence of blended learning with using the alternative treatment design which is a type of counterbalanced design that consists of only two interventions of "A" and "B" called the alternative treatment design (**Error! Reference source not found.**) (9). In this research, the factor analysis method was used to survey the interest of the volunteers.
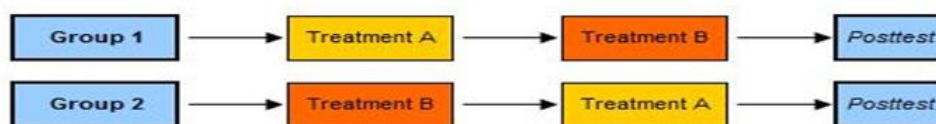

Figure 1. The alternative treatment design method or dual-interventional counterbalanced design

Results

The mean age of participants in the medical school with MD degrees was 24.25±4.833 years in men and 22.72±0.895 years in women, and the mean age of students, all of whom were female, was 21.33±0.9 years in the health faculty with bachelor's degrees. The highest mean age (24.1±4.78 years) pertained to the first group in the medical school, and the lowest mean age (21.13±0.84 years) pertained to the first group in the health faculty. In both faculties: 86.8% of collegians were married, 50% resided in dormitories, and all were in the fifth semester or higher, Leven's test (P=0.626) with variances equality in both groups (the first=1.841 and the second=1.328) to the random division correctness of the groups. No significant difference between the mean total scores was observed of the first and second pretests in the first group (3.9) and the second group (4.53) according to the equal variance t-test formula (t=-1.172, df=36, P=0.249); therefore, random division of the participants for equivalency of the two groups was successful.

Factor analysis

Factor analysis is a statistical method used to describe variability among observed, correlated variables (13).

Interest index

The participation interest questionnaire in the course was created by considering three main components (attitude, motivation, satisfaction); For choosing the number of items to extract, first, the exploratory factor analysis (EFA) with the Principal Axis Factoring (PAF) method was used, then, the confirmatory factor analysis (CFA) was done with the maximum likelihood method, to evaluate the construct validity of the questionnaire.

A: Exploratory factor analysis (EFA)

Confirmatory factor analysis is a method that shows how many items to measure a construct are correctly selected. Before starting the factor analysis, the appropriateness of the number of samples should be checked. For this verification, two methods could be applied: the Bartlett sphericity test and the Kaiser-Meyer-Olkin (KMO) Measure. KMO index is in the range of zero to one. The desired data (sample size) is suitable for factor analysis if it is close to one; Otherwise (usually less than 0.6), the factor analysis results are not proper for that; As well as In Bartlett's test, if the significance level is less than 5%, factor analysis is suitable for identifying the components (factor model) (12). At the initial factor analysis, the KMO index was more than 0.7 (0.820), and

Bartlett's test was completely significant (Sig=0.000). According to the communalism column and the factor matrix, four items were deleted with the lowest correlation with the others.

According to Total Variance Explained, the three factors of attitude (first factor), satisfaction (second factor), and motivation (third factor) after rotation accounted for 30.3%, 23.32%, and 12.58% of the total 66.2% of the variance, respectively.

The items loaded on each factor are shown in (**Error! R eference source not found.**), so the items with loadings lower than 0.45 have also been removed to improve clarity. To measure the first factor (attitude), nine components were used, in the questionnaire, and due to their high load, all of them remained. But regarding the items of the second factor (satisfaction) and the third factor (motivation), respectively, 7 out of 9 items and 4 out of 6 items were left in the questionnaire, and the rest were removed due to productivity of less than 0.45. Scree Plot of Total Variance Explained, illustrated in (**Error! R eference source not found.**).

Table 1. The final result of the factor analysis of the participation interest questionnaire

Variables (Number) A: Workshop / Web-based B: Web-based / Workshop	factor loading*			communalism
	1	2	3	
My educational needs are paid more attention in combined education A than B. (9)	0.917			0.873
Learning material from other students in the same group in combined education A is more than B (7)	0.866			0.836
The intimacy between the professor and the student is greater in A combined education than in B. (4)	0.789			0.854
Group discussion in combined education A can have more continuity than B. (6)	0.780			0.773
I am more prepared to understand the statistical content in combined education A than B. (8)	0.775			0.784
Motivating me by combined teaching A is more than B to learn vital statistics lesson. (3)	0.713			0.838
Teaching vital statistics with the combined method A is better than B. (2)	0.705			0.861
A combined teaching of A makes it easier to understand vital statistics concepts than B. (1)	0.662			0.843
Intimacy between students in combined education A is more than in B. (5)	0.494			0.588
Learning is more suitable for me in blended learning A than B. (10)		0.873		0.812
I would recommend hybrid training A more than B to my friends. (13)		0.817		0.855
A combination of A and B should be used in most cases. (12)		0.767		0.877
Combined training A provides me more learning opportunities than B. (14)		0.715		0.877
I would rather enroll in combined training A than in combined training B. (16)		0.693		0.813
A blended learning of A versus B allows me to control my own pace of learning. (11)		0.663		0.878
I enjoy learning statistics in blended learning A more than B. (15)	0.558	0.560		0.776
I expect to have acceptable learning. (20)			0.863	0.850
With proper study, I can learn the material. (21)			0.853	0.776
I think about where I am weak. (24)			0.725	0.669
I think about questions that I don't know the answers to. (22)			0.511	0.546

Extraction Method: Principal Axis Factoring
Rotation Method: Varimax with Kaiser Normalization
Rotation converged in 5 iterations
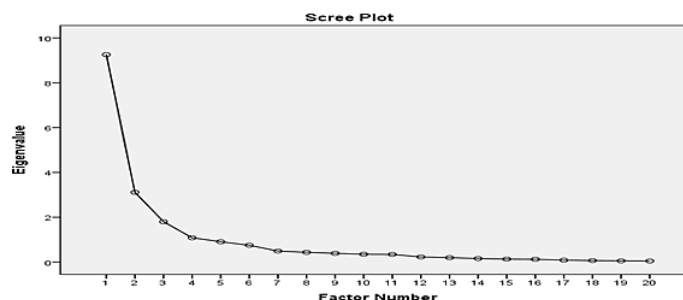* Absolute value below: 0/45

Figure 2. Scree plot of total variance explained

B: Confirmatory factor analysis (CFA)

As shown in (Table 2), the KMO value is meritorious (>0.80) and middling (>0.70) but in the Faculty of Health and only in the two factors of motivation and satisfaction it is mediocre (>0.60) (14). As well as the significance level of Bartlett's test for all factors is less than 5% (<0.0001), which shows factor analysis is suitable for identifying the structure (factor model). Also, the factor scores above 0.50 of the items (Table 3), confirm the convergence and structural validity of the questionnaire.

Table 2. Confirmatory factor analysis by structure and faculty

Faculty/Index			Motivation measurement Components	Attitude measurement components	Satisfaction measurement components
Both faculties	**Kaiser index**		0.765	0.861	0.865
	Bartlett test	Chi-Square	76.916	338.101	263.415
		df	6	36	21
		Sig	0.000	0.000	0.000
	Number of remaining questions		4	9	7
	factor variance (rotated)		55.897	62.161	64.469
Medical School	**Kaiser index**		0.709	0.864	0.848
	Bartlett test	Chi-Square	989.54	273.485	163.339
		df	6	36	21
		Sig	0.000	0.000	0.000
	Number of remaining questions		4	9	7
	factor variance (rotated)		55.332	65.58	60.737
Faculty of Health	**Kaiser index**		0.664	0.636	0.759
	Bartlett test	Chi-Square	692.25	111.071	107.324
		df	6	36	21
		Sig	0.000	0.000	0.000
	Number of remaining questions		4	9	7
	factor variance (rotated)		59.061	61.482	65.471

Calculation of the interest index

To calculate this index, factor scores obtained from the three components of motivation, attitude, and satisfaction, were summed, and the groups were compared in each faculty.

Regarding the attitude factor score in the health faculty, medical school, and both (Table 4), significant differences existed in the mean scores between the first and second groups ($P<0.05$).

Regarding the motivation factor score, the difference in the mean cumulative score of motivation analysis between the two groups in both faculties (t=-2.188, df=49, $P=0.033$) was significant. However, the results showed no difference between the first and second groups in the medical school (t=-1.757, df=34, $P=0.088$) and the health faculty (t=-1.320, df=13, $P=0.210$) (Table 5).

Regarding the satisfaction factor score in the health faculty, medical school, and both of them, also, (Table 6) indicated a significant difference in the mean scores between the first and second groups ($P<0.05$).

According to the results of the test obtained based on the accumulation of the scores of three components of attitude, motivation, and satisfaction (Table 7), the table of independent t-tests shows that the difference in the means in both faculties was significant ($P<0.05$). Although the difference is not significant in the faculty of

health, according to the *P* of 0.051, it can be considered significant. In other words, there is more interest in participating in blended training courses in group (A) which first received face-to-face and then web-based training, than in group (B) which first received web-based and then face-to-face training. In other words, indicating the interest in blended learning among students in form of the first workshop and then web based.

Table 3. Factorial matrix of items by faculty

Faculty	Factor		Factor scores								
Both faculties	**Attitude**	Item number	9	7	4	3	6	2	8	1	5
		Productivity	0.883	0.882	0.864	0.803	0.791	0.748	.0764	0.739	0.598
	Satisfaction	Item number	14	13	12	16	10	15	11		
		Productivity	0.872	0.859	0.817	0.802	0.8	0.75	0.708		
	Motivation	Item number	20	21	22	24					
		Productivity	0.884	0.823	0.71	0.522					
Medical school	**Attitude**	Item number	1	9	4	3	8	7	6	2	5
		Productivity	0.879	0.876	0.874	0.863	0.832	0.794	0.773	0.702	0.663
	Satisfaction	Item number	12	13	10	14	11	15	16		
		Productivity	0.849	0.824	0.821	0.819	0.819	0.66	0.633		
	Motivation	Item number	21	20	24	22					
		Productivity	0.915	0.829	0.631	0.539					
Faculty of health	**Attitude**	Item number	7	9	4	2	3	6	1	8	5
		Productivity	0.972	0.902	0.875	0.848	0.8	0.797	0.618	0.592	0.527
	Satisfaction	Item number	16	14	13	10	12	15	11		
		Productivity	0.987	0.938	0.879	0.809	0.746	0.699	0.508		
	Motivation	Item number	20	24	21	22					
		Productivity	0.999	0.777	0.681	0.554					

Table 4. Results of independent t-test for attitude factor scores between two groups

Group name		N	Mean	Std. Deviation	Std. Error Mean	F	t	df	Sig. (2-tailed)
Factor score for analysis Attitude medical school	**Group1(A)**	19	0/5442783	0/74323691	0/17051024				
	Group2(B)	17	-0/6083110	0/90614304	0/21977197	0/165	4/190	34	0/000
Factor score for analysis Attitude health school	**Group1(A)**	8	0/6635581	0/65486102	0/23152834				
	Group2(B)	6	-0/8847441	0/59648848	0/24351540	0/409	4/542	12	0/001
Factor score for analysis Attitude medical & health schools	**Group1(A)**	27	0/5944012	0/72377321	0/13929022				
	Group2(B)	23	-0/6977754	0/81581062	0/17010827	0/160	5/935	48	0/000

Table 5. Results of independent t-test for motivation factor scores between two groups

Group name		N	Mean	Std. Deviation	Std. Error Mean	F	t	df	Sig. (2-tailed)
Factor score for analysis Motivation medical school	**Group1(A)**	20	-0/2544463	1/14271347	0/25551850				
	Group2(B)	16	0/3180579	0/69649030	0/17412258	6/363	-1/757	34	0/088
Factor score for analysis Motivation health school	**Group1(A)**	8	-0/3105846	1/17031072	0/41376732				
	Group2(B)	7	0/3549539	0/67810540	0/25629975	1/106	-1/320	13	0/210
factor score for analysis Motivation medical & health schools	**Group1(A)**	28	-0.2677328	1.13165806	0.21386327				
	Group2(B)	23	0.3259356	0.70620640	0.14725421	7.264	-2.188	49	0.033

Table 6. Results of independent t-test for satisfaction factor scores between two groups

Group name		N	Mean	Std. Deviation	Std. Error Mean	F	t	df	Sig. (2-tailed)
Factor score for analysis Satisfaction medical school	Group1(A)	19	0/4762928	0/95464186	0/21900986	0/183	3/559	33	0/001
	Group2(B)	16	-0/5655977	0/73788921	0/18447230				
Factor score for analysis Satisfaction health school	Group1(A)	8	0/6273125	0/72253315	0/25545405	0/739	3/477	13	0/004
	Group2(B)	7	-0/7169286	0/77454784	0/29275157				
Factor score for analysis Satisfaction medical & health schools	Group1(A)	27	0/5153577	0/92157409	0/17735702	1/169	4/732	48	0/000
	Group2(B)	23	-0/6049851	0/71760477	0/14963094				

Table 7. Independent t-test results for interest factor scores between two groups

Group name		N	Mean	Std. Deviation	Std. Error Mean	F	t	df	Sig. (2-tailed)
Factor score for analysis interest Medical school	Group1(A)	18	0/6789	2/02923	0/47829	0/393	2/113	31	0/043
	Group2(B)	15	-0/7930	1/94634	0/50254				
Factor score for analysis interest Health school	Group1(A)	8	0/9803	2/22300	0/78595	0/497	2/165	12	0/051
	Group2(B)	6	-1/3060	1/50219	0/61327				
Factor score for analysis interest Medical & health school	Group1(A)	26	0/7706	2/05865	0/40374	1/711	3/071	45	0/004
	Group2(B)	21	-0/9242	1/63260	0/35626				

Discussion

Paying attention to the attitude in social psychology and its effect on creating readiness to do work has been proven (15). In the current research, a significant difference between the groups in the mean scores of the attitude factor ($P<0.001$) indicated the students' attention to the combined AB blended learning to type, who first received face-to-face and then web-based training. According to (Kotler, 1966, 1994; Kotler & Stonich, 1991) "Customer satisfaction indicates the fulfillment that customers derive from doing business with a firm. In other words, it's how happy the customers are with their transaction and overall experience with the company." (16). Therefore, in any type of training, studying the satisfaction of the participants can be effective in achieving the goals; So, since was existed a significant difference between groups in medical school (t=3.559, df=33, P=0.001), health faculty (t=3.447, df=13, P=0.004) and both of them (t=4.732, df=48, P=0.000), it is recommended blended learning method with face-to-face/web-based training. Suadiyanto *et al.*, citing Christiana and Chowdhury, expressed motivation as one

of the vital aspects of achieving academic goals and achievement (17). The significant difference between the groups in the accumulated mean scores of the two faculties (P=0.033) indicated the existence of students' motivational differences among them, although there was no significant difference between the mean scores in the groups of the medical school and the groups of the health school ($P>0.05$). In other words, the motivation to participate in the face-to-face/web-based (AB) workshop was more than web-based/face-to-face (BA). Meanwhile, these results are supported and advocated by the existing significant difference between the groups in the medical school and also both faculties in the interest index of students ($P<0.05$). Interest is a feeling of liking, pleasure, and interest in something without the influence of other people. If something cannot give pleasure, then people will not have an interest in it. Therefore, students who are interested in workshops mean these students are interested and think workshop are fun. Meanwhile, students who are less interested in the workshop think that the workshop is difficult and scary (18-19).

As a different experiment, this study aimed to consider interest in the sequence of executing a 2-day

blended learning workshop in the medical school and health faculty of Arak Medical Sciences University. We compared separately the interest indices of Motivation, Attitude, and Satisfaction, as well as the cumulative of them of the two groups. The final result indicated students' interest was dependent on the A-B and B-A sequence in the blended learning of Vital Statistics Workshop, and the A-B sequence was favorable.

Limitations

The limited number of references and backgrounds due to the novelty of this study in the medical sciences universities, the difficulty of coordinating the implementation of the workshop due to the need for audio-visual equipment and computers, and the lack of proper internet bandwidth were among the limitations of the present study. Considering that the subject of the research was a statistics course, in order to increase the results of the research, it was decided to select a community of students of the University of Medical Sciences who are interested in statistics and conducting research, so the research community of students who are members of the student research committee were included and the reason for the limited community Instead of sampling, a census method was used and all students were considered members of the research committee.

Acknowledgements

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