Iranian Journal of Educational Sociology
(Interdisciplinary Journal of Education)
Available online at: http://www.iase-idje.ir/
Volume 4, Number 4, March 2022

A Comparison Study on the Effect of Two Teaching Methods of Brainstorming and Group Discussion by E-Learning on Learning Level and Interest in Teamwork in Social Studies Course

Marjan Masoumifard[1*]

1. Assistant Professor, Department of Educational science, Faculty of Education and Psychology, Payeme Noor university, P.O.Box 19395-4697, Tehran, Iran.

Article history:
Received date: 2021/10/20
Review date: 2021/12/18
Accepted date: 2021/12/22

Keywords:
Teaching Method, Brainstorming, Group Discussion, E-Learning, Learning, Interest in Teamwork

Abstract

Purpose: Since the prevalence of Covid-19 increased the use of e-learning and its dual importance in teaching methods, this study aimed to compare the effect of two teaching methods of brainstorming and group discussion by e-learning on learning level and interest in teamwork in social studies course.

Methodology: This was an applied study in terms of purpose and semi-experimental with pre-test and post-test design in terms of implementation method. The study population was the third-grade elementary school students in district 20 of Tehran in the academic year of 2020-2021. The sample size was 60 students in two classes with 30 ones who were selected by available sampling method. One of the classes was considered as a teaching group with brainstorming method in a random way and the other class was considered as a teaching group with group discussion method. The teacher-made test of learning level in the social studies course and the teamwork interest questionnaire (Evans & Jarvis, 1986) were used to collect the data.

Findings: The results of paired t-test showed that both methods of teaching brainstorming and group discussion by e-learning enhanced the level of learning and interest in teamwork in social studies course ($P < 0.001$). The results of univariate analysis of covariance showed that the group discussion teaching method in comparison with the brainstorming teaching method enhanced the learning level and interest in teamwork in the social studies course ($P < 0.001$).

Conclusion: The results showed the effectiveness of both methods and the greater impact of group discussion teaching method compared to the brainstorming teaching method in both variables of learning level and interest in teamwork. Therefore, the use of group discussion teaching method should be prioritized to improve academic performance in social studies course.

Please cite this article as: Masoumifard M. (2022), A Comparison Study on the Effect of Two Teaching Methods of Brainstorming and Group Discussion By E-Learning on Learning Level and Interest in Teamwork in Social Studies Course, **Iranian Journal of Educational Sociology.** 4(4): 10-18.

* Corresponding Author: mmf587@gmail.com

[Downloaded from iase-idje.ir on 2024-03-29]

[DOR: 20.1001.1.26453460.2021.4.4.2.9]
[DOI: 10.52547/ijes.4.4.10]

1. Introduction

In any educational system, the learners are considered as the main element in educational design and all goals and educational programs are designed with the aim of making desirable changes in them (Liu, Simpkins & Vandell, 2021). Development in any society stems from the efficient and correct education system (Padilla-Romo, 2022). Learning is one of the most important topics in the field of educational systems that has been the subject of many researches (Wang, Liang, Lin & Tsai, 2017). There are different definitions of learning; in a definition, it means making relatively lasting changes in people based on experience and in another definition, it means the knowledge, information and scientific principles and skills and ability to apply them when faced with new situations (Rivas, Gonzalez-Briones, Hernandez, Prieto & Chamoso, 2021). Learning is a process of an individual's desire or inclination to achieve educational goals that leads the learner to make a holistic assessment according to his/her metrics, striving for success, and enjoying it (Neroni, Meijs, Gijselaers, Kirschner & De Groot, 2019). One of the important variables in the discussion on student learning is group learning and interest in teamwork (Motycka, Egelund, Gannon, Genuardi, Gautam, Stittsworth & et al, 2018). A group is a collection of people consisting of two or more ones who interact with each other regularly to achieve common goals and do things in a coordinated manner (Paige, Kerdolff, Rogers, Garbee, Yu, Cao & et al, 2021). Interest in teamwork means interest in the conscious, cohesive, and coordinated efforts of a group of people who are on a particular subject and to achieve common goals through the optimal use of ability, talent, and creativity (Singh, Bhullar & Sankaran, 2019). Teamwork and activities are broader and more complex than individual work and activities, and as students enter the work process, the quality of their learning will also increase; Usually teamwork will bring people to a higher level of performance Carson, Laird, Reid, Deeny & McGarvey, 2018). Teamwork enhances synergy and improves productivity; The ability to engage in group activities has become one of the competencies needed by learners today (Gosselin, Marceau, Vincelette, Daneau, Lavoie & Ledoux, 2019).

There are four important elements in curriculum design including purpose, content, teaching methods and evaluation methods. The teaching methods element is the most important, effective and influential element in the curriculum (Gao, Yang, Zou & Fan, 2021). Teaching methods are a set of stlevelgies and measures that the teacher usually uses according to the existing conditions and facilities to guide students' activities and to achieve the educational goals (Ozbal, 2019). It is up to the teacher to choose the best and most appropriate teaching method according to the situation, and in general, learners learn more when they work together than when they try alone, which shows the importance of using active teaching methods (Pech, Rehor & Slabova, 2021).

One of the active teaching methods is the teaching method of brainstorming (Babut, 2021). In brainstorming, a group of people try to come up with group solutions and ideas about an issue without judging them (Unin & Bearing, 2016). The purpose of brainstorming is to sepalevel the process of generating responses from the evaluation process, because evaluation and judgment often hinder the flourishing of creativity and expression of various responses and cause the suppression (Malkawi & Smadi, 2018). In the brainstorming method, students sit together and discuss a topic, and each person expresses any solution that comes to mind, and the teacher, as a guide and facilitator, teaches all the material and solutions (Clark, Harbaugh & Seider, 2019). The brainstorming teaching method by Osborn (1938) was based on two principles and four rules, which include the importance of diversity of opinions and the existence of more than one solution to a problem and the role of the quantity of solutions in improving their quality and rules including the prohibition of criticism and evaluation, free and direct comment, emphasizing the quantity and integration and improvement of suggestions and solutions (Mentzer, Farrington & Tennenhouse, 2015). Brainstorming method has an effective role in enhancing the creativity and learning knowledge and skills, promoting participation and responsibility, improving social support and reducing stress, anxiety, frustration and helplessness (Al Masri, 2019).

[Downloaded from iase-idje.ir on 2024-03-29]
[DOR: 20.1001.1.26453460.2021.4.4.2.9]
[DOI: 10.52547/ijes.4.4.10]

Another active teaching method is the group discussion teaching method (Wester, 2021), which is a regular, structured, and thought-provoking conversation about a single topic and all participants in the discussion are interested in, and is usually led by students and sometimes teachers (Gayman & Jimenez, 2020). In group discussion, learners learn by experiencing along with an atmosphere of collaboration and participation in thinking, freely expressing their views, and evaluating the discussions and views of others (Lin & Xie, 2017). The group discussion method is a learning-oriented method in which learners actively participate in educational activities using the discussion method and are given the opportunity to interact with others (Handayani, Genisa & Triyanto, 2019). In this way, students actively participate in various topics and are given the opportunity to share their opinions and experiences with others and to be able to criticize others while accepting criticism (Sare, Tulviste, Luik, 2019). The group discussion teaching method requires skills such as thinking, comprehending, learning and memorizing (Erduran, Kaya, Cilekrenkli, Akgun & Aksoz, 2021). It increases students' interaction and exchange skills such as the power of expression, promotes tolerance and perseverance in hearing different opinions, improves learning by working with others and reduces shyness, anxiety and negative self-esteem (Bungum, Boe & Henriksen, 2018).

In recent years, the prevalence of Covid-19 has increased the use of different teaching methods from the context of e-learning and its double importance in teaching methods (Alavudeen, Easwaran, Mir, Shahrani, Aseeri, Khan & et al, 2021). One of the major changes and developments in the field of education and learning is the use of information and communication technology and as a result, the increasing use of e-learning (Firat, Ozturk, Gunes, Colak, Beyaz & Buyuk, 2019). Virtual education using the advances of information and communication technology is one of the new stlevelgies for the development of educational justice in today's world, and e-learning is one of its examples (Shahabadi & Uplane, 2015). E-learning is defined as a technology-based learning system, organization and management that gives learners the ability to learn through e-learning and facilitates the learning process (Alhabeeb & Rowley, 2018). E-learning as a comprehensive learning method can be implemented in any place and time, and each learner, according to the speed and power of their learning, learns the material without the stress of learning and running out of time (Puska, Ejubovic, Dalic & Puska, 2021). The most important benefits of e-learning include the ability to teach at any time and place, the reproducibility of the teaching and learning process, the change from a teacher-centered to a student-centered education system, and the reduction of teaching and learning costs (Dikmen, 2020).

The research has been done on the effect of two methods of teaching brainstorming and group discussion on learning, however no research has been found on the comparison them and interest in teamwork; The results of the most important researches are reported as follows. Zeynali, Tajikesmaeili, Niroomand & Mozaffari (2020) concluded that both brainstorming and problem-solving methods increased teacher-student interaction and its subscales including leadership, supportive behavior, comprehension and responsibility; the effectiveness of brainstorming teaching method was much more than the problem-solving method. The results of the research by Nosrati (2019) showed that brainstorming method enhanced the students' math learning. Al Masri (2019) in a study concluded that the use of brainstorming enhanced creative thinking and English language development in tenth-grade students. In another study, Rahbar, Assareh, Ahmadi & Salehsadgpour (2018) reported that the teaching method of brainstorming enhanced the students' creativity and academic achievement. Malkawi & Smadi (2018) concluded that the use of brainstorming stlevelgy led to the development of academic achievement of sixth-grade students. Also, Shafiei & Dousti (2020) concluded that the group discussion teaching method increased the students' learning. The results of the study by Aghapour, Vakili, Karbasi & Badeli (2015) showed that the student-centered group discussion teaching method increased students' learning compared to the lecture teaching method. In another study, Lee & Ertmer (2006) reported that small group discussions enhanced teachers' knowledge and skills.

[Downloaded from iase-idje.ir on 2024-03-29]
[DOR: 20.1001.1.26453460.2021.4.4.2.9]
[DOI: 10.52547/ijes.4.4.10]

The prevalence of Covid-19 increased the use of e-learning and its importance in teaching methods. Therefore, the use of e-learning teaching methods in the current situation can be of great help in achieving educational goals, and two methods of teaching brainstorming and group discussion are the active teaching methods whose effectiveness has been less researched; In addition to few researches on their impact, no study was found to compare them on learning and interest in teamwork. Therefore, using the results of this study, teachers can be suggested to use a practical method. As a result, this study aimed to compare the effect of two methods of teaching brainstorming and group discussion by e-learning on the learning level and interest in teamwork in social studies course.

2. Methodology

This was an applied study in terms of purpose and semi-experimental with pre-test and post-test design in terms of implementation method. The study population was the third-grade elementary school students in district 20 of Tehran in the academic year of 2020-2021. The sample size was 60 students in two classes with 30 ones who were selected by available sampling method. Sample selection criteria included having parents' consent to participate in the study, not having Covid-19 in the past month, not receiving psychological services in the last three months, not taking psychiatric medicines and not occurring stressful events such as divorce and death of loved ones in last three months. Also, in case of canceling the continuation of cooperation and participating in intervention sessions and absence more than two sessions, samples would be excluded from the study. The research process was as follows: after coordination with the officials of the Education Department in district 20 of Tehran, a list of schools was prepared and two schools were selected by simple random method and one class from each school was selected as a sample. One of the classes was considered as a teaching group with brainstorming method in a random way and the other class was considered as a teaching group with group discussion method. For the teachers of each of two classes, a briefing session was held and the teaching method was fully explained to them and they were asked to present the social studies course to the students in the mentioned method. Pre-test was taken from students of both groups; the first group trained the social studies course for 12 sessions with the brainstorming teaching method in the e-learning method and the second group was trained the social studies course for 12 sessions with the group discussion teaching method in the e-learning method. Then the post-test was taken from students of both groups. It should be noted that in the pre-test and post-test, students were evaluated by the following two tools.

The first tool was the teacher-made test for the learning level in the social studies course. The test was designed by three qualified third-grade elementary school teachers in consultation and consensus; the face and content validity of the teacher-made test was confirmed by 10 third-grade elementary school teachers and its reliability was obtained 0.89 by Cronbach's alpha method.

The second tool was the Evans & Jarvis (1986) Interest in Teamwork Questionnaire. The questionnaire had 20 items that were scored in nine options from strongly disagree (score one) to strongly agree (score no). The score of interest in teamwork questionnaire was calculated through the total score of the items; The minimum score was 20 and the maximum score was 180 and the higher score indicates more interest in teamwork. The score between 20-60 indicated a weak interest in teamwork, the score between 61-100 indicated a modelevel interest in teamwork, and the score above 100 indicated a high interest in teamwork. The developers confirmed the content validity of the tool and reported its reliability in various studies using the Cronbach's alpha method in the range of 0.90 to 0.97. In Iran, Karami, Mohamadzadeh Ghasr & Afshari (2012) reported the reliability of the interest in teamwork questionnaire using Cronbach's alpha method in the pre-test stage 0.86 and in the post-test stage 0.89. In this study, the face and content validity of the interest in teamwork questionnaire was confirmed by 10 professors of educational psychology and its reliability was obtained 0.89 by Cronbach's alpha method. Data were analyzed by paired t-test and univariate analysis of covariance in SPSS software version 21 at a significance level of less than 0.05.

[Downloaded from iase-idje.ir on 2024-03-29]
[DOR: 20.1001.1.26453460.2021.4.4.2.9]
[DOI: 10.52547/ijes.4.4.10]

3. Findings

A summary of the results of the paired t-test to compare the learning level and interest in teamwork in the social studies course for the two methods of teaching brainstorming and group discussion by e-learning is presented in Table 1.

Table1. Summary of the results of paired t-test to compare the learning level and interest in teamwork of each group

variable	stage	Pre-test		Post-test		Significance
		mean	Standard deviation	mean	Standard deviation	
learning level	brainstorming	9/76	3/08	13/33	2/13	0/001
	group discussion	10/54	3/17	17/93	2/61	0/001
interest in teamwork	brainstorming	67/39	6/75	75/40	7/66	0/001
	group discussion	65/80	6/24	89/33	8/52	0/001

As observed in Table 1, there was a significant difference between the groups of brainstorming teaching method and group discussion method by e-learning in both variables of learning level and interest in teamwork in social studies course compared to pre-test and post-test stages. In other words, both intervention methods improved the learning level and interest in teamwork in the social studies course (P <0.001.(

Examination of pre-hypothesis of univariate analysis of covariance showed that the hypothesis of normality based on Kolmogorov-Smirnov test for the learning level and interest in teamwork in the pretest and posttest stages, the hypothesis of equality of variances of variables based on Leven test and the hypothesis of slope equality of regression lines based on the group interaction and pre-test were not rejected (P> 0.05). Therefore, the use of univariate analysis of covariance is allowed. A summary of the results of univariate analysis of covariance to compare the effect of two teaching methods of brainstorming and group discussion by e-learning method on the learning level in social studies course is presented in Table 2.

Table2. Summary of the results of univariate analysis of covariance to compare the effect of two teaching methods of brainstorming and group discussion by e-learning method on the learning level in social studies course

variable	stage	Pre-test		Post-test		Significance
		mean	Standard deviation	mean	Standard deviation	
learning level	brainstorming	9/76	3/08	13/33	2/13	0/001
	group discussion	10/54	3/17	17/93	2/61	0/001
interest in teamwork	brainstorming	67/39	6/75	75/40	7/66	0/001
	group discussion	65/80	6/24	89/33	8/52	0/001

As observed in Table 2, there was a significant difference between the groups of brainstorming teaching method and group discussion method by e-learning in the variable of learning level in social studies course. According to the number of means, the group discussion teaching method increased the learning level in the social studies course compared to the brainstorming teaching method (P <0.001). A summary of the results of univariate analysis of covariance to compare the effect of two methods of teaching brainstorming and group discussion by e-learning method on interest in teamwork in social studies course can be observed in Table 3 methods in order to assess the chances and challenges of virtual learning.

[Downloaded from iase-idje.ir on 2024-03-29]
[DOR: 20.1001.1.26453460.2021.4.4.2.9]
[DOI: 10.52547/ijes.4.4.10]

Table3. Summary of the results of univariate analysis of covariance to compare the effect of two methods of teaching brainstorming and group discussion by e-learning on interest in teamwork in social studies course

source	Sum of squares	Freedom degree	Mean of squares	Statistics f	significance	Impact factor	statistical power
Pre-test	35/32	1	35/32	2/81	0/031	0/41	0/60
group	318/02	1	318/02	25/28	0/001	0/82	0/94
error	718/31	57	12/57				

As observed in Table 3, there was a significant difference between the groups of brainstorming teaching method and discussion teaching method by e-learning method in the variable of interest in teamwork in social studies course. According to the number of means, the group discussion teaching method increased the interest in teamwork in the social studies course compared to the brainstorming teaching method ($P < 0.001$).

4. Discussion

The discussion of teaching methods has always been one of the important discussions in education and the prevalence of Covid-19 has led to the implementation in e-learning. This study aimed to compare the effect of two methods of teaching brainstorming and group discussion by e-learning method on the learning level and interest in teamwork in social studies course. The results showed that the brainstorming teaching method by e-learning enhanced the learning level and interest in teamwork in social studies course, which are consistent with the studied by Rahbar et al (2018) and Malkawi & Smadi (2018). In the brainstorming teaching method, the teacher raises questions that need to be answered by the ability to think differently. The teacher who uses this teaching method respects all the students' opinions in a way that categorizes them all, and this makes the students gain a new and creative view of the next situations and experiences in the field of doing different activities. Another important point is that in the brainstorming teaching method through e-learning, the teacher asks the students to discuss the ideas and solutions provided by other students. The same discussion and active participation of students in class leads the students believe that they have the right to comment in class. Since this teaching method places more value on presenting new, innovative, and original ideas and comments, it is clear that students who are allowed to participate in the discussion try to come up with new and creative solutions as much as possible, and be more willing to participate in the above-mentioned teaching method, which is a group method. As a result, the brainstorming teaching method through e-learning can cause the mentioned teaching method to play an effective role in enhancing the learning level and interest in teamwork of third-grade elementary school students in social studies course.

Other results showed that the group discussion teaching method by e-learning enhanced the learning level and interest in teamwork in social studies course, which are consistent with the results of the studies by Shafiei & Dousti (2020), Aghapour et al (2015) and Lee & Ertmer. (2006). The group discussion teaching method allows learners to communicate with each other within the group; It increases their cooperation, self-confidence and understanding. Some experts believe that this method strengthens the spirit of cooperation, leadership and critique, and the ability to listen to the opinions of others. In fact, the group discussion method strengthens the learners' power of expression and increases the tolerance of people in hearing different opinions, and through cooperation with others, it can also increase the skills of interaction and exchange with others. Another important point is that the group discussion teaching method by e-learning is one of the active teaching methods and accepting responsibility in the group to learn the concepts causes the learning level to increase, Because in this method, no student can succeed unless the other members of the group also succeed. In this teaching method, when students are in a group and among classmates and engage in the same activity, a sense of competition will be subconsciously evoked between them and they perform more and more desirable activities, which will make the class more active and dynamic; In such a situation, all students make an extra effort. As a result, the group discussion teaching

[Downloaded from iase-idje.ir on 2024-03-29]
[DOR: 20.1001.1.26453460.2021.4.4.2.9]
[DOI: 10.52547/ijes.4.4.10]

method through e-learning enhances the learning level and interest in teamwork of third-grade elementary school students in social studies course.

Also, the results showed that the group discussion teaching method compared to the brainstorming teaching method enhanced the learning level and interest in teamwork in the social studies course, which was not found any researches in this field. The probable reason for the greater impact of the group discussion teaching method compared to the brainstorming teaching method goes back to the nature of the course. Since the social studies course is a course that is best taught using the group discussion teaching method compared to the brainstorming teaching method. The social studies course is also suitable for teaching with the brainstorming teaching method, and the teacher can ask students to express different solutions to the problem by asking different questions about the course. Given the above and since the social studies course is more suitable for group discussion teaching, it can be expected that the group discussion teaching method compared to the brainstorming teaching method electronically has a greater impact on enhancing the learning level and interest in teamwork of third-grade elementary school students in social studies course.

The most important strengths of this study include the relatively large sample size (30 people in each group) and the comparison of two teaching methods of brainstorming and group discussion by e-learning that were not compared in previous studies. The most important weaknesses or limitations of this study included using the available sampling method to select samples and not following the results in the long run due to time constraints and the prevalence of Quid-19. Therefore, it is suggested that researchers randomly select a number of people in the future, after a relatively large sample size with eligibility criteria. Since the level of sampling error in random sampling method is less than the available sampling method, another suggestion is to examine the effect of brainstorming teaching method and group discussion teaching method on e-learning in the long run, i.e., a few months after the intervention. As a final suggestion, we can compare the effect of group discussion teaching method by e-learning with other teaching methods such as participatory learning method by e-learning.

The results of this study showed the effect of both teaching methods of brainstorming and group discussion by e-learning on the learning level and interest in teamwork in social studies course and the greater impact of group discussion teaching method compared to brainstorming method in both variables of learning level and interested in teamwork. Therefore, the use of group discussion teaching method should be prioritized to improve academic performance in social studies course. As a result, it is necessary to hold workshops and in-service courses on different teaching methods, especially group discussion teaching method for teachers, and in addition, more emphasis on group discussion teaching method in student-teacher teaching method.

Acknowledgement

We sincerely thank the teachers of the research classes and the students who participated in the research and their parents who agreed with them to participate in the research.

[Downloaded from iase-idje.ir on 2024-03-29]

[DOR: 20.1001.1.26453460.2021.4.4.2.9]

[DOI: 10.52547/ijes.4.4.10]

References

Aghapour SA, Vakili MA, Karbasi M, Badeli R. (2015). Comparison the effect of student-based group discussion and lecture methods teaching on midwifery student's learning level. Education Stlevelgies in Medical Sciences. 8(5): 281-286. [Persian]

Al Masri A. (2019). The impact of using brainstorming in the development of creative thinking and achievement in the English language of the 10th grade students at King Abdullah II schools of excellence in Amman. International Education Studies. 12(2): 82-92.

Alavudeen SS, Easwaran V, Mir JI, Shahrani SM, Aseeri AA, Khan NA, et al. (2021). The influence of COVID-19 related psychological and demographic variables on the effectiveness of e-learning among health care students in the southern region of Saudi Arabia. Saudi Pharmaceutical Journal. 29(7): 775-780.

Alhabeeb A, Rowley J. (2018). E-learning critical success factors: Comparing perspectives from academic staff and students. Computers & Education. 127: 1-12.

Babut TM. (2021). Brainstorming and modern teaching stlevelgies in preschool education. Acta Didactica Napocensia. 14(1): 201-207.

Bungum B, Boe MV, Henriksen EK. (2018). Quantum talk: How small-group discussions may enhance students' understanding in quantum physics. Science Education. 102(4): 856-877.

Carson OM, Laird EA, Reid BB, Deeny PG, McGarvey HE. (2018). Enhancing teamwork using a creativity-focussed learning intervention for undergraduate nursing students - A pilot study. Nurse Education in Practice. 30: 20-26.

Clark S, Harbaugh AG, Seider S. (2019). Fostering adolescent curiosity through a question brainstorming intervention. Journal of Adolescence. 75: 98-112.

Dikmen M. (2020). The mediating role of medical students' attitudes towards distance education in the relationship between e-learning styles and academic achievements. Journal of Educational Issues. 6(2): 351-373.

Erduran S, Kaya E, Cilekrenkli A, Akgun S, Aksoz B. (2021). Perceptions of nature of science emerging in group discussions: A comparative account of pre-service teachers from Turkey and England. International Journal of Science and Mathematics Education. 19(7): 1375-1396.

Evans NJ, Jarvis PA. (1986). The group attitude scale: A measure of attraction to group. Small Group Research. 17(2): 203-216.

Firat M, Ozturk A, Gunes I, Colak E, Beyaz M, Buyuk K. (2019). How e-learning engagement time affects academic achievement in e-learning environments. A large-scale study of open and distance learners. Open Praxis. 11(2): 129-141.

Gao J, Yang L, Zou J, Fan X. (2021). Comparison of the influence of massive open online courses and traditional teaching methods in medical education in China: A meta-analysis. Biochemistry and Molecular Biology Education. 49(4): 639-651.

Gayman CM, Jimenez ST. (2020). Varying the preparation guide and group discussion in a classroom analysis of interteaching. Journal of the Scholarship of Teaching and Learning. 20(2): 31-43.

Gosselin E, Marceau M, Vincelette C, Daneau CO, Lavoie S, Ledoux I. (2019). French translation and validation of the mayo high performance teamwork scale for nursing students in a high-fidelity simulation context. Clinical Simulation in Nursing. 30: 25-33.

Handayani RD, Genisa MU, Triyanto T. (2019). Empowering physics students' performance in a group discussion through two types of peer assessment. International Journal of Instruction. 12(1): 655-668.

Karmi M, Mohammadzade Ghasr A, Afshari M. (2012). The effect of cooperative learning on group tendency and academic achievement of high school students in Mashhad. Research in Curriculum Planning, 9(33): 93-105. [Persian]

Lee Y, Ertmer PA. (2006). Examining the effect of small group discussions and question prompts on vicarious learning outcomes. Journal of Research on Technology in Education. 39(1): 66-80.

Lin SY, Xie Y. (2017). Effects of tagcloud-anchored group discussions on pre-service teachers' collaborative knowledge construction. Australasian Journal of Educational Technology. 33(2): 73-85.

Liu Y, Simpkins SD, Vandell DL. (2021). Developmental pathways linking the quality and intensity of organized afterschool activities in middle school to academic performance in high school. Journal of Adolescence. 92: 152-164.

[Downloaded from iase-idje.ir on 2024-03-29]

[DOR: 20.1001.1.26453460.2021.4.4.2.9]

[DOI: 10.52547/ijes.4.4.10]

Malkawi NAM, Smadi M. (2018). The effectiveness of using brainstorming stlevelgy in the development of academic achievement of sixth grade students in English grammar at public schools in Jordan. International Education Studies. 11(3): 92-100.

Mentzer N, Farrington S, Tennenhouse J. (2015). Stlevelgies for teaching brainstorming in design education. Technology and Engineering Teacher. 74(8): 8-13.

Motycka C, Egelund EF, Gannon J, Genuardi F, Gautam S, Stittsworth S, et al. (2018). Using interprofessional medication management simulations to impact student attitudes toward teamwork to prevent medication errors. Currents in Pharmacy Teaching and Learning. 10(7): 982-989.

Neroni J, Meijs C, Gijselaers HJM, Kirschner PA, De Groot RHM. (2019). Learning stlevelgies and academic performance in distance education. Learning and Individual Differences. 73: 1-7.

Nosrati S. (2019). The effectiveness of brainstorming method to increase students' math learning. Ourmozd Journal. 46(2): 5-46. [Persian]

Ozbal AF. (2019). Implementation of microteaching in special teaching methods I and II courses: An action research. International Education Studies. 12(10): 89-95.

Padilla-Romo M. (2022). Full-time schools, policy-induced school switching, and academic performance. Journal of Economic Behavior & Organization. 196: 79-103.

Paige JT, Kerdolff KE, Rogers CL, Garbee DD, Yu Q, Cao W, et al. (2021). Improvement in student-led debriefing analysis after simulation-based team training using a revised teamwork assessment tool. Surgery. 170(6): 1659-1664.

Pech M, Rehor P, Slabova M. (2021). Students preferences in teaching methods of entrepreneurship education. Journal on Efficiency and Responsibility in Education and Science. 14(2): 66-78.

Puska E, Ejubovic A, Dalic N, Puska A. (2021). Examination of influence of e-learning on academic success on the example of Bosnia and Herzegovina. Education and Information Technologies. 26(2): 1977-1994.

Rahbar A, Assareh A, Ahmadi Gh, Salehsadgpour B. (2018). The effect of teaching methods of brain presenting on the creativity and academic achievement of the 7th grade male students in the first and secondary schools in the area of three Karaj, 1395-1394. Quarterly Journal of Innovation and Creativity in Human Sciences. 7(3): 251-276. [Persian]

Rivas A, Gonzalez-Briones A, Hernandez G, Prieto J, Chamoso P. (2021). Artificial neural network analysis of the academic performance of students in virtual learning environments. Neurocomputing. 423: 713-720.

Sare E, Tulviste T, Luik P. (2019). The function of questions in developing a preschooler's verbal reasoning skills during philosophical group discussions. Early Child Development and Care. 189(4): 555-568.

Shafiei S, Dousti A. (2020). The effect of group discussion teaching method on students' learning Journal of Islamic Studies and Research. 2(12): 59-69. [Persian]

Shahabadi M, Uplane M. (2015). Synchronous and Asynchronous e-learning Styles and Academic Performance of e-learners. Procedia – Social and Behavioral Sciences. 176: 129-138.

Singh R, Bhullar N, Sankaran K. (2019). Leader-versus-member and fair-versus-biased categorisations as safeguards against negative effects of demographic diversity on group attraction. IIMB Management Review. 31(1): 7-19.

Unin N, Bearing P. (2016). Brainstorming as a Way to Approach Student-centered Learning in the ESL Classroom. Procedia – Social and Behavioral Sciences. 224: 605-612.

Wang YL, Liang JC, Lin CY, Tsai CC. (2017). Identifying Taiwanese junior-high school students' mathematics learning profiles and their roles in mathematics learning self-efficacy and academic performance. Learning and Individual Differences. 54: 92-101.

Wester JS. (2021). Students' possibilities to learn from group discussions integleveld in whole-class teaching in mathematics. Scandinavian Journal of Educational Research. 65(6): 1020-1036.

Zeynali B, Tajikesmaeili S, Niroomand L, Mozaffari A. (2020). The comparison of the effectiveness of teaching methods of brainstorming and problem solving on teacher-student interaction. Journal of Teaching Research. 8(2): 130-146. [Persian].

[Downloaded from iase-idje.ir on 2024-03-29]

[DOR: 20.1001.1.26453460.2021.4.4.2.9]

[DOI: 10.52547/ijes.4.4.10]