



ORIGINAL ARTICLE

Investigating the Improvement of Medical Students' Autonomy in Learning English Conversation under Flipped

التحقيق في تحسين استقلالية طلاب الطب في تعلم المحادثة باللغة الإنجليزية ظل التعلم المعكوس

Shila Soleymani^{1,*}, Khadijeh Aliabadi¹, Ismail Zaraii Zavaraki¹, Ali Delavar²

¹Department of Instructional Technology, Faculty of Psychology & Education, Allameh Tabataba'i University, Tehran, Iran

²Evaluating and Measuring Department, Faculty of Psychology and Educational Sciences, University of Allameh Tabataba'i, Tehran, Iran

*Faculty of Psychology & Education
Varzesh sq., Dehkadeh Olympic
Tehran, 1489684511
Iran

Tel: +98 9153066076
Email:
soleymani.shila@yahoo.com

Background: Due to the need for autonomy (self-control and self-management), desire to learn, and performance of medical students to learn English conversation, the present study aimed to investigate the effect of conducting the flipped learning pattern on improving effective teaching strategies.

Methods: The present study is a quasi-experimental pretest-posttest design with a control group. The statistical sample was selected in an accessible manner with a random replacement of 120 people (50 people in each group). To collect data, Fisher, King, and Tague's (2001) autonomy and self-directed questionnaire was first administered to control and experimental groups. Then the control group learned English conversation in the usual way and the experimental group under the flipped learning pattern. Finally, a post-test was performed in both groups.

Results: The results of univariate analysis of covariance (ANCOVA), repeated measures test, and comparison of self-directed learning readiness of the studied samples before and after the intervention showed a significant effect of this teaching method on improving students' self-direction and autonomy.

Conclusion: The results indicated that the value and acceptability of the pattern besides traditional teaching methods have a great impact on students' autonomy, desire to learn, and learning performance. Implementing similar research in different courses and on more examples are two suggestions for future research.

Keywords: Autonomy, Flipped Learning (FL), English conversation, Medical Student, Pattern

الخلفية: نظراً للحاجة إلى الاستقلالية (ضبط النفس والإدارة الذاتية)، والرغبة في التعلم، وأداء طلاب الطب لتعلم المحادثة باللغة الإنجليزية، تهدف الدراسة الحالية إلى التحقق من تأثير إجراء غط التعلم المعكوس على تحسين التدريس الفعال الاستراتيجيات.

الطرق: الدراسة الحالية عبارة عن تصميم شبه تجريبي للاختبار القبلي والبعدي مع مجموعة ضابطة. تم اختيار العينة الإحصائية بطريقة يسهل الوصول إليها مع استبدال عشوائي لـ 120 شخصاً (50 شخصاً في كل مجموعة). لجمع البيانات، تم تطبيق الاستقلالية الذاتية والاستبيان الموجه ذاتياً فيشر و كينج و تاج (2001) لأول مرة على مجموعات التحكم والمجموعات التجريبية. ثم تعلمت المجموعة الضابطة محادثة اللغة الإنجليزية بالطريقة المعتادة والمجموعة التجريبية تحت غط التعلم المعكوس. أخيراً، تم إجراء اختبار لاحق في كلا المجموعتين.

النتائج: أظهرت نتائج التحليل أحادي المتغير للتباين المشترك (ANCOVA) واختبار القياسات المتكررة ومقارنة الاستعداد للتعلم الذاتي للعينات المدروسة قبل وبعد التدخل تأثيراً معنوياً لطريقة التدريس هذه في تحسين التوجيه الذاتي للطلاب. استقلال.

الخلاصة: أشارت النتائج إلى أن قيمة ومقبولية النمط إلى جانب طرق التدريس التقليدية لها تأثير كبير على استقلالية الطلاب ورغبتهم في التعلم وأداء التعلم. إجراء بحث مماثل في دورات مختلفة وعلى المزيد من الأمثلة هما اقتراحان للبحث في المستقبل.

الكلمات المفتاحية: الاستقلالية، التعلم المعكوس (FL)، محادثة اللغة الإنجليزية، طالب الطب، النمط

بررسی تأثیر الگویی یادگیری معکوس بر استقلال دانشجویان علوم پزشکی در یادگیری مکالمه انگلیسی

فلپڈ لرننگ کے تحت انگریزی گفتگو سیکھنے میں میڈیکل طلباء کی خود مختاری میں بہتری کی تحقیقات

زمینه و هدف: با توجه به نیاز استقلال (خودکنترلی و خودمدیریتی)، رغبت به یادگیری و عملکرد دانشجویان علوم پزشکی برای یادگیری مکالمه انگلیسی امری ضروری می باشد، لذا پژوهش حاضر با هدف بررسی اثربخشی الگویی یادگیری معکوس در صدد ارائه راهبردهای تدریس مؤثر است.

روش: تحقیق حاضر یک طرح نیمه تجربی پیش آزمون-پس آزمون با گروه کنترل است. نمونه آماری به صورت در دسترس با جایگزینی تصادفی تعداد 120 نفر (هر گروه 50 نفر) بود. به منظور جمع آوری داده ها، ابتدا پرسشنامه بررسی استقلال و خودراهبری فیشر، کینگ و تاگو (Fisher, King, and Tague, 2001) روی گروه کنترل و آزمایش اجرا شد. سپس گروه کنترل به روش معمول و گروه آزمایش تحت الگویی یادگیری معکوس مکالمه انگلیسی را فرا گرفتند. در پایان دوره، پس آزمون روی هر دو گروه انجام شد.

یافته ها: یافته های حاصل از آزمون تحلیل کوواریانس تک متغیره (انکووا، ANCOVA)، آزمون اندازه گیری مکرر و مقایسه میزان آمادگی یادگیری خودراهبر نمونه های مورد مطالعه قبل و بعد از مداخله اثر معنی دار این روش تدریس را بر بهبود خودراهبری و استقلال دانشجویان نشان داد.

نتیجه گیری: نتایج حکایت از ارزش و مقبولیت الگو در کنار روش های تدریس سنتی و تأثیر فراوان آن بر استقلال، رغبت به یادگیری و عملکرد یادگیری دانشجویان دارد. اجرای پژوهش های همانند در دروس مختلف علوم پزشکی و بر روی نمونه های بیشتر، بهره مندی از این الگو جهت تقویت مهارت های زبانی و مشارکت فراگیران در کلاس از جمله پیشنهادها برای پژوهش های آتی است.

واژه های کلیدی: الگو، یادگیری معکوس، استقلال، دانشجوی علوم پزشکی، مکالمه زبان انگلیسی

پس منظر: خودمختاری کی ضرورت (خود پر قابو اور خود نظم و نسق)، سیکھنے کی خواہش، اور میڈیکل طلباء کی انگریزی گفتگو سیکھنے کی کارکردگی کی وجہ سے، موجودہ مطالعہ کا مقصد مؤثر تدریس کو بہتر بنانے پر فلپ شدہ سیکھنے کے انداز کو انجام دینے کے اثرات کی تحقیقات کرنا ہے۔ حکمت عملی

طریقے: موجودہ مطالعہ ایک کنٹرول گروپ کے ساتھ ایک نیم تجرباتی pretest-posttest ڈیزائن ہے۔ شماریاتی نمونے کو 120 افراد (ہر گروپ میں 50 افراد) کی بے ترتیب تبدیلی کے ساتھ قابل رسائی انداز میں منتخب کیا گیا تھا۔ ڈیٹا اکٹھا کرنے کے لیے، Fisher, King, and Tague's (2001) خود مختاری اور خود ہدایت شدہ سوالنامہ سب سے پہلے کنٹرول اور تجرباتی گروپوں کو دیا گیا۔ پھر کنٹرول گروپ نے معمول کے انداز میں انگریزی گفتگو سیکھی اور تجرباتی گروپ نے فلپڈ لرننگ پیٹرن کے تحت۔ آخر میں دونوں گروپوں میں پوسٹ ٹیسٹ کیا گیا۔

نتائج: کوویریئنس (ANCOVA) کے غیر متغیر تجزیہ کے نتائج، بار بار اقدامات کے ٹیسٹ، اور مداخلت سے پہلے اور بعد میں مطالعہ شدہ نمونوں کی خود ہدایت سیکھنے کی تیاری کے موازنہ نے طلباء کی خود سمت کو بہتر بنانے پر اس تدریسی طریقہ کار کا نمایاں اثر ظاہر کیا۔ خودمختاری

نتیجہ: نتائج نے اشارہ کیا کہ روایتی تدریسی طریقوں کے علاوہ پیٹرن کی قدر اور قابل قبولیت طلباء کی خود مختاری، سیکھنے کی خواہش اور سیکھنے کی کارکردگی پر بہت زیادہ اثر ڈالتی ہے۔ اسی طرح کی تحقیق کو مختلف کورسز میں نافذ کرنا اور مزید مثالوں پر مستقبل کی تحقیق کے لیے دو تجاویز ہیں۔

کلیدی الفاظ: خودمختاری، فلپڈ لرننگ (FL)، انگریزی گفتگو، طبی طالب علم، پیٹرن

INTRODUCTION

In the present age, which is one of the most complex and astonishing human ages, the science is advancing rapidly; to this end the society must learn and increase knowledge, skills, and change attitudes to sustain and adapt to its environment continuously on an ongoing basis also it should accept transformation, change, and keep up with it as well (1). It is impossible to transfer knowledge to instructors and the classroom quickly because of the speed of change and updating of science. After a while, due to social and technological changes, a large part of the knowledge and sciences taught in schools and universities need to be reviewed (2).

The inability of conventional education to generalize learning to similar situations in the face of the increasing development of science, technology, and human knowledge, the lack of an effective system and effective teaching methods that can facilitate the development of analytical and critical thinking skills are some of the necessities to pay attention to these developments, too (3). If learners want to be able to cope with future problems, learning the required English language skills is necessary. So it sounds important to incorporate it into the curriculum of medical universities, emphasize the creation of attractive learning opportunities, strengthen learners' enduring competencies to learn thinking skills, make the right decision, and solve complex problems of today's society (4). According to these cases, instructors engage learners with the essential learning materials. Also, they teach learners how to learn by using teaching methods in which their minds are active (5). Choosing new teaching-learning methods tailored to the goals, content, pervasive characteristics, and type of assessment is very important for instructors (6). Among these, as one of the effective methods in sustainable learning of medical education, the use of a flipped learning pattern is introduced (7).

This approach, called inverted learning (8), flipped classroom (9), inverted classroom (10), reverse classroom (11), backward classroom (12), flipped teaching (13), and flipped instruction (14). It is a type of learning in which the teacher's lecture and teaching take place at home, and the assignments and activities that the learners used to do at home are transferred to the classroom (15). In this learning pattern, the instructor interacts with learners individually or in groups to promote active learning in order to increase the level of involvement (16). Also, the instructor's teaching, which used to be lecturing-oriented, is now available in the form of video, text, and educational slides or audio content and is provided to learners before the class so that they become familiar with the new lesson content and learn the resources provided before the class. (17). Instructors act as a facilitator in the flipped classroom. They pay attention to the learners in need, and provide explanations when it is necessary (18). After class, teachers and learners can interact to solve the problems via the internet or any communication technology to solve them (19).

In this regard, two of the necessary learning components are performance and autonomy of learners. They can bond in

connection with this type of teaching method in medical universities very strongly because learners take the initiative to identify their own learning needs, determine learning objectives, identify resources and materials needed for learning, select and implement appropriate learning strategies, evaluate their learning outcomes, and act on them with or without the help of others (20). One of these components is self-control. It means that learners can analyze, plan, execute, and evaluate their learning activities independently. The second component is self-management. It is about learners' ability to identify what they need during the learning process, set learning goals, control their time and energy for learning, and survey their achievements. The desire to learn is another component that points to the motivation of learners to acquire knowledge to achieve the best learning outcomes by utilizing existing learning resources and practical learning strategies to overcome the problems that exist in the learning process (4). Therefore, in investigating the autonomy and performance in learning English conversation in the class, where teaching is done under the flipped learning pattern, not only do instructors not have all the supervision, but not all decisions about the learning process are left to the learners, too. The main task of the instructors is to investigate the weaknesses, find appropriate strategies for the learning styles of learners, and create or shape research and search skills in them (21).

According to the conducted studies on the research subject and the presented opinions from the experts in this field, this teaching method has been used in many abroad studies and to a much lesser extent in the country, and it is going uphill. The results obtained from the research showed that the effect of flipped learning on the performance and strength of learners' autonomy (self-control, self-management, and desire to learn) increases their satisfaction with the teaching method, which has a significant role (22). It also increases active participation, fosters learners' abilities and talents in the educational process, and improves their performance (23). Flipped learning enhances critical thinking and the use of their imagination and improves learners' attitudes toward learning, too (24). It has a positive effect on the development of metacognition and social skills of learners (25), strengthens problem-solving skills, and enhances a sense of responsibility in learners (26). This teaching method improves further interaction between teachers and learners and enhances self-assessment of work results (27), having been approved by researchers and education specialists. Teaching in a learning-centered manner is one of the concerns in higher education in the present age. To answer the below questions, the researchers did this study:

1. To what extent is the autonomy in medical students' self-control of English conversation learning affected by the flipped learning pattern?
2. To what extent is the autonomy in medical students' self-management of English conversation learning affected by the flipped learning pattern?
3. To what extent is the autonomy in medical students' desire to learn English conversation affected by the flipped learning pattern?

METHODS

This research is quantitative, and its method is quasi-experimental with pre-test and post-test. All students who studied at the University of Medical Sciences but were registered at the Aladdin Short-Term Specialized Training Center from 2018 to 2020 (284 people) were the statistical population of this study. Among these, the sample was 120 students chosen in a purposeful and accessible manner, with a random replacement. The criteria for selecting language learners, in addition to the field of study that should be one of the fields of medical sciences, was also based on the desire of the students. Also, their original language was not English. The implementation of this method lasted for 14 months in 8 courses (4 courses for every experimental and control group). Studies showed that the autonomy and self-directed scale have internal reliability and coherence in several samples (20, 28-31).

The research instrument was a self-directed learning questionnaire prepared by Fisher et al. based on a Likert scale of five options and measures learners' self-directed and autonomy in learning (20). It has 52 items and three subscales (self-management (questions 1-10), desire to learn (questions 11-19), and self-control (questions 20-29). Fisher et al.'s research findings in Australia showed that the overall reliability of this scale was reported by Cronbach's alpha of 83%, for the self-management subscale 87%, desire to learn 85%, and self-control 80% (Table 1). Another randomized experimental study showed the internal consistency of these scales by using Cronbach's alpha coefficient. They reported 87% for self-management, 85% for the desire to learn, 89% for self-control, and 95% for the whole scale (28). Bridges, Bierema, and Valentine also achieved Cronbach's alpha coefficient of 87% for self-management, 85% for the desire to learn, and 80% for self-control (29).

The validity of this questionnaire in Iran by Nadi and Sajjadian was 82% for the whole test, 78% for the self-management subscale, 71% for the desire to learn, and 60% for self-control (30). Ghobadi, Haddadi, and Dadashzadeh reported 86% of Cronbach's alpha in the questionnaire, 76% in self-management, 55% in the desire to learn, and 70% in self-control components (31). Cronbach's alpha coefficient for the whole study was 87%, 83% for self-management, 78% for the desire to learn, and for self-control at 81% in the present study.

As a pre-test, this questionnaire was first given to the control and experimental groups. Then, in the control group, teaching was done in the usual way by all language training centers. It means that instructors use oral or written lecture

presentations. Learners use retention, repetition, and question-and-answer methods that ignore learners' interests, talents, and individual differences (32). In the experimental group, instructors teach concepts in reverse. In this way, instructors prepared books, slides, educational booklets, and interactive tests and made them available to learners before class by introducing suitable social network platforms due to easy access (Telegram and WhatsApp).

The researchers removed questionnaires of participants who did not answer completely or did not answer. The questionnaires of 100 students were finally analyzed. The researchers used a repeated measurement test and a univariate analysis of covariance (ANCOVA) to analyze the research findings.

RESULTS

Because the significance level of Box's M test was higher than 0.05, the researchers did not violate assuming the homogeneity of internal correlations and covariance matrix in the pre-test and post-test stages of the two groups. Considering the necessary statistical assumptions in Table 1-Box's M test results, there were internal correlations and homogeneity of the covariance matrix in three scales.

After the implementation and according to the pre-test and post-test data, the researchers analyzed the data obtained from the research in the inferential section to answer the questions separately presented below. For comparisons obtained from measuring research questions (Table 2) which is the use of flipped learning pattern on the autonomy of medical students in learning English conversation, the present researchers used a statistical test of a univariate analysis in covariance (ANCOVA) to compare the three scales: self-control, self-management, and the desire to learn.

As shown in Table 3, the researchers used a repeated measure test to compare the three scales.

DISCUSSION

The positive effect of implementing this teaching method on improving autonomy (self-control and self-management), desire to learn, and attention to the performance of medical students were the results of the present study. In Table 3, the mean of pre- and post-test were significant in all subscales ($p < 0.05$). It means that the self-control performance scale of English conversation of medical students in the experimental group ($x = 39.18$ and $x = 43.48$) was better and more effective than the control group ($x = 38.98$ and $x = 2.22$) ($F = 104.599$). = And $p = 0.0001$). The results of research by Dewi et al. (33) and Piri et al. (2), being in line with this question, showed that teaching English lessons using flipped

Table 1. Results of Box's M test of internal correlations of covariance matrix

Scales/ Test	Box's M	F	df1	df2	Sig.
Self-control	2.207	0.719	3	172872	0.54
Self-management	19.072	6.217	3	172872	0.063
Desire to learn	3.948	1.287	3	172872	0.277

Table 2. Describing the effect of flipped learning pattern on the autonomy of medical students in learning English conversation in three scales of self-control, self-management, and the desire to learn in two experimental and control groups, and two stages of pre-test and post-test

Group	Test	Scale	Descriptive indicators		
			<i>n</i>	\bar{x}	<i>s</i>
Control	Pre-test	Self-control		38.98	3
		Self-management	50	33.7	3.38
		Desire to learn		33.52	3.85
	Post-test	Self-control		42.22	2.44
		Self-management	50	38.76	2.04
		Desire to learn		38.96	1.85
Experimental	Pre-test	Self-control		39.18	3.01
		Self-management	50	32.14	3.34
		Desire to learn		33.78	3.75
	Post-test	Self-control		43.48	2.97
		Self-management	50	38.24	1.09
		Desire to learn		39.58	2.36

Table 3. Results of a repeated measurement test, comparison of the effect of three scales on conversation learning English of medical students

Scale	F	df	Sig.
Self-control	104.599	1	0.0001
Self-management	261.848	1	0.0001
Desire to learn	135.028	1	0.0001

learning compared to traditional teaching has a positive effect on self-control dimension of learners. Between traditional methods and flipped learning patterns, García Botero et al. (34) and Ezadi et al. (35) also reported a significant difference and greater impact of the flipped learning patterns on learners' self-control.

The results of Bagheri and Joshqannejad (36)'s research are contrary to these findings. In their view, flipped learning has no significant effect on the self-control subscale. Therefore, implementing the flipped learning pattern has a positive effect on learners' self-control, self-regulation, and self-orientation because they have a responsibility to learn. The use of learning techniques, self-understanding, and practical tests increase when instructors use the flipped learning pattern, according to the results. This approach showed that small lectures help learners take responsibility for their learning. On the other hand, the involvement of learners is a necessary key factor in the lectures that leads to an effective learning environment and improves self-control in English conversation among medical students.

Based on the significant results obtained from the mean of pre-test and post-test of the self-management performance scale of English language learning conversation of medical students, the comparison of the means indicated that the self-management performance of learners in the experimental group ($x = 32.14$ and $x = 38.24$) is better and more effective than the control group ($x = 33.7$ and $x = 38.76$). Although the

mean of self-management of the subjects in the experimental and control groups followed an upward trend, the mean of this subscale in the experimental group increased by 6.10 points from the pre-test to the post-test. Meanwhile, the mean of self-management of the subjects in the control group from pre-test to post-test increased by 5.06 points ($F = 261.884$ and $p = 0.0001$). Research results of O'Shea, Jackson, Khodabandehloo, et al., Park, Lee, and Du (37-41) were in line with this part of the research. The results of Bagheri and Joshqannejad (36), Dewi et al. (33), Yang and Chen 's research (42) are in line with the results of this research question. They considered the role of flipped learning to be effective in self-directed learning of self-management and showed that flipped classroom has a significant effect on the variables of students' academic achievement and academic self-management.

Based on the results, the mean of pre-test ($x = 33.52$) and post-test ($x = 38.96$) of the desire to learn in the control group and its significant difference from those in the experimental group (pre-test ($x = 33.78$) and post-test ($x = 39.58$)) showed the necessity of the model in the experimental group. According to the results, indicating the upward trend of the mean in the experimental and control groups, the subscale means in the experimental group have increased by 5.80 points from pre-test to post-test. Meanwhile, the mean performance of the subjects with the desire to learn in the control group from pre-test to post-test increased by 5.44 points ($F = 0.035$ and $p = 0.0001$). It means that the implementation of the teaching pattern in the experimental group had a better and more significant effect than in the control group. De Oliveira Fassbinder et al., Missildine et al., and Amresh et al. (43-45) resulted the similar findings of their research. These findings are also in line with the results of research by Du, Dewi et al., García Botero et al., Wang and Christiansen, and Piri et al., (41, 34, 46, 2), who also considered the flipped learning to be effective on the dimension of learners' desire to learn of self-

directed learning. The flipped learning pattern has a greater effect and significant difference in the learners' motivation and desire to learn, according to Ezadi, Najafnezhad, Azizi-Shomami (35)'s research.

According to Zainuddin et al. (47), flipped learning affects motivation and desire to learn. Sharifi Ghortani and Nadi (48) also found that self-directed learning has a high effect on the desire to learn and the academic achievement of students. Khaknejad and Mardakhoda Rudmajani (49) reported that the flipped classroom has a significant advantage over the conventional teaching method in increasing the desire to learn and motivating academic achievement. The quantitative results of Bahmani et al. (50) have also emphasized the significant effect of the flipped learning pattern on the desire to learn. Therefore, the use of homework and tests in the classroom and learning content at home improves the desire to learn and motivation of learners and increases their performance, and leads them to do more activities in the classroom.

The findings of the study also have limitations. They include a small collection of learners chosen from accessible and purposeful samples identified only from learners enrolled in the Aladdin English Language Center. Therefore, the results are not possible to be generalized to other fields, courses, groups, or even colleges. Other limitations are the lack of strict ethical, privacy, and copyright rules related to users' use of content, devices, and electronic resources without developers' permission.

The specific suggestion of the research for future researchers is to acquaint instructors with influential factors for realizing the strategies of implementing a flipped learning pattern. These factors in the study that have a high impact on the effect of the pattern included: context (time management, teaching materials, and lesson plan) and intervening conditions (individual, educational, organizational, and cultural factors). Instructors need to consider the role of these factors and their impact on better and more efficient implementation of flipped learning strategies. They should keep in their mind that these may vary from environment to environment or from situation to situation. Because the factors affect the quantity and quality of performance, instructors need to survey their situation and conditions before implementing the strategies according to the implementation situation and take steps to remove potential obstacles. In addition in the present study, only one researcher trained learners. In this case, they may have given incorrect answers to satisfy their instructor. It is recommended that different instructors teach the course to

implement the pattern. It is also necessary to hold in-service training courses for new or unfamiliar instructors to familiarize them with how to perform their flipped learning courses. Further research seems essential to identify the benefits, barriers, effects, and efficiency of the approach in teaching-learning activities in implementation.

In Conclusion, Since autonomy (self-control and self-management), desire to learn, and attention to learners' performance are subscales of self-directed learning, the results showed that the implementation of the flipped learning pattern has a positive effect on improving students' self-direction and autonomy and their levels of self-direction in learning English conversation. It shows the value and acceptability of the pattern along with traditional teaching methods on the autonomy, desire to learn, and learning performance of students, and increases their self-confidence. The purpose of all strategies and teaching methods is to lead learners to academic success, prepare them for how to face the problems of social life, and create the ability to solve problems in them according to the results of the research. An effective way to strengthen academic skills, including improving performance, autonomy (self-control and self-management), and the desire to learn, is a flipped learning. It also fosters curiosity, deep learning, axial learner, and democracy. The method pays attention to the real cognition of learners and their academic engagement. In a rapidly changing world and information age, flipped learning emphasizes educational technologies and individual skills of medical students in learning English conversation. In addition to these effects, reverse learning can create an atmosphere of collaboration with learners' prior preparation and an optimal classroom atmosphere. Accordingly, it has led to the academic achievement of learners.

Ethical considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

ACKNOWLEDGEMENTS

The researchers thank the distinguished professors and students for helping us achieve the research results. This article is part of the PhD thesis of Dr. Shila Soleymani thesis number 2856002.

Financial support: None

Conflict of Interest: It is declared none.

REFERENCES

1. Soleymani S. Information and communication technology in higher education, Tehran: Rashdin. 2014. Persian.
2. Piri MO, Sahebyar H, Sadollahi A. The effect of flipped classroom on self-directed learning in English language classes course. *Technology of Education Journal (TEJ)*. 2018;12(2):141-8. Persian.
3. Taghipour HA, Keshavarzelshkenari R, Youseforshidi AA. Content knowledge of teacher methods and its impact on students' academic achievement. Conference on modern research in Iran and the world in management, economics, accounting and humanities. 2017. Persian.
4. Soleymani S, Aliabadi K, Zaraii Zavaraki I, Delavar A. The effect of Flipped Learning Pattern (FLP) in terms of Problem-Based Teaching Approach (PBTA) on applicants' Self-Directed Learning (SDL) towards the English courses. *Journal of Foreign Language Teaching and Translation Studies*. 2021;6(2):87-116.
5. Mirdrikvand F, Hosseinnezhad GHR, Aliasgari M, Adibmanesh M. The effect of active teaching method on academic performance in science: the case of 3rd-grade junior high school students in Andimeshk city (2010-2011). *Research in Curriculum Planning*, 2016; 12(47): 133-44.

6. Ahmadnejad M, Fathi J. The contribution of an EFL blog-mediated writing course to enhance learner autonomy. *Journal of Research in Teaching*. 2019; 7(2): 141-60. Persian.
7. Lee G, Wallace A. Flipped learning in English as a foreign language classroom: Outcomes and perceptions. *TESOL quarterly*. 2018;52(1):62-84.
8. Latif MS. The effect of the inverted learning method on the Edmodo platform in learning the skills of blocking and defending the court in volleyball for students. *Journal mustansiriyah of sports science*. 2021;3(3): 220-32.
9. Galindo-Dominguez H. Flipped Classroom in the Educational System. *Educ Tech Soc*. 2021;24(3):44-60.
10. Teichgräber U, Mensel B, Franiel T, Herzog A, Cho-Nöth CH, Mentzel HJ, Ingwersen M, Aschenbach R. Virtual inverted classroom to replace in-person radiology lectures at the time of the COVID-19 pandemic- a prospective evaluation and historic comparison. *BMC med educ*. 2021;21(1):1-10.
11. Khoshnood H, Bakhtiyarpour S, Pasha R, Bavi S. The Comparison of the effectiveness of reverse classroom and social based-network classrooms on Creativity and Academic Performance of students. *The Journal of New Thoughts on Education*. 2020;16(2):195-224. Persian.
12. Bitetti L. Activate business model learning through flipped classroom and backward design. *Journal of Business Models*. 2019;7(3):100-10.
13. Jiang L, Zang N, Zhou N, Cao H. English teachers' intention to use flipped teaching: interrelationships with needs satisfaction, motivation, self-efficacy, belief, and support. *Comput Assist Lang Learn*. 2021;19:1-30.
14. Awuor NO, Weng C, Militar R. Teamwork competency and satisfaction in online group project-based engineering course: The cross-level moderating effect of collective efficacy and flipped instruction. *Comput Educ*. 2022; 176:104357.
15. Bergman J, Sams A. Flipped learning. *International Society for Technology in Education*. 2014.
16. Fazlali F, Alavi S, Keivanpanah S. The effect of flipped professional development on English language teachers' engagement and attitude. *Foreign Language Research Journal*, 2018; 7(2): 471-96. Persian.
17. Bergmann J, Sams A. Before you flip, consider this. *Phi Delta Kappan*. 2012;94(2): 25-25.
18. Lopes AP, Soares F. Video lectures and online activities to engage students in a flipped classroom. In *Proceedings of Edulearn16 Conference 4th-6th July 2016*; 1: 8688-95.
19. Yu Z, Gao M. Effects of video length on a flipped English classroom. *SAGE Open*. 2022;12(1): 21582440211068474.
20. Fisher M, King J, Tague G. Development of a self-directed learning readiness scale for nursing education. *Nurse educ today*. 2001;21(7):516-25.
21. Eugene SS. Learning styles: a holistic approach. *J Eur Ind Train*. 1996;20(7):29-36.
22. Kidane HH, Roebertsen H, Van der Vleuten CP. Students' perceptions towards self-directed learning in Ethiopian medical schools with new innovative curriculum: a mixed-method study. *BMC med educ*. 2020;20(1):1-0.
23. Hartman ND, Harper EN, Leppert LM, Browning BM, Askew K, Manthey DE, Mahler SA. A Multidisciplinary Self-Directed Learning Module Improves Knowledge of a Quality Improvement Instrument: The HEART Pathway. *J Healthc Qual*. 2018;40(1): e9-e14.
24. Li DH, Jiang BS, Li HY, Liu XP. Design of experiment course "Computer-aided landscape design" based on flipped classroom. *Comput Appl Eng Educ*. 2016; 24(2): 234-40.
25. Ge X, Chua BL. The role of self-directed learning in PBL: Implications for learners and scaffolding design. *The Wiley Handbook of Problem-Based Learning*. 2019;367- 88.
26. Van Lankveld W, Maas M, van Wijchen J, Visser V, Staal JB. Self-regulated learning in physical therapy education: a non-randomized experimental study comparing self-directed and instruction-based learning. *BMC med educ*. 2019;19(1):1-9.
27. Lee S, Kim DH, Chae SM. Self-directed learning and professional values of nursing students. *Nurse educ pract*. 2020; 42:102647.
28. Wiley K. Effects of a self-directed learning project and preference for structure on self-directed learning readiness. *Nurs Res*. 1983;32(3):181-5.
29. Bridges PH, Bierema LL, Valentine T. The propensity to adopt evidence-based practice among physical therapists. *BMC Health Serv Res*. 2007;7(1):1-9.
30. Nadi AM, Sajadian I. Standardization of self Directed Learning Reading scale on girls student of Isfahan high schools. *Educational Innovations*. 2006;5(4):111-34. Persian.
31. Ghobadi K, Haddadi S, Dadashzade S. Achievement goals prioritization of nursing and midwifery students and its relationship with self-directed learning. *Education Strategies in Medical Sciences*. 2015;8(4):223-9. Persian.
32. Hossaini Nasab D, Fallah N. The Effect of traditional teaching and cooperation teaching on students' Achievement and Attitude toward Mearef Islami Lesson in college student of Tabriz city (year 87-88). *Journal of Instruction and Evaluation*. 2008;1(3):41-80. Persian.
33. Dewi NS, Marlina N, Supriyono Y. The quest of self-directed learning of adult EFL learners in Indonesian higher education context. *JEELS (J. Eng. Educ. Linguist. Stud.)*. 2019;6(1):73-90.
34. García Botero G, Questier F, Zhu C. Self-directed language learning in a mobile-assisted, out-of-class context: do students walk the talk. *Comput Assist Lang Learn*. 2019;32(1-2):71-97.
35. Ezadi S, Najafnezhad F, Azizi-Shomami M. The Effect of Flipped Classroom Approach on Academic Achievement, Learning Motivation, Sense of belonging, Achievement Motivation, and Self-Regulation Compared to Traditional Approach among Elementary Sixth Grade Students. *Research in Teaching*. 2020;8(3):252-82. Persian.
36. Bagheri, M., Joshaghan Nejjad, F. Effect of flipped learning method on students' self-directed learning readiness and learning in the computer basics course. *Journal of Curriculum Technology*, 2016; 1(1): 49-61. Persian.
37. O'Shea E. Self-directed learning in nurse education: a review of the literature. *J adv nurs*. 2003;43(1):62-70.
38. Jackson J. *Language, Identity, and Study Abroad*, London: Equinox. 2008.
39. Khodabandehlou M, Jahandar S, Seyedi G, Abadi RM. The impact of self-directed learning strategies on reading comprehension. *International Journal of Scientific & Engineering Research*. 2012;3(7):1-9. Persian.
40. Park JH, Lee EK. Influence of professor trust, self-directed learning and self-esteem on satisfaction with major study in nursing students. *The Korean Data & Information Science Society*. 2018;29(1):167-78.
41. Du Y. Study on cultivating college students' English autonomous learning ability under the flipped classroom model. *English Language Teaching*. 2020;13(6):13-9.
42. Yang CC, Chen Y. Implementing the flipped classroom approach in primary English classrooms in China. *Educ Inform Tech*. 2020;25(2):1217-35.
43. De Oliveira Fassbinder A.G, Moreira D, Cruz G, Barbosa E.F. Tools for the flipped classroom model: An experiment in teacher education. In *2014 IEEE Frontiers in Education Conference (FIE) Proceedings*, 1-8.
44. Missildine K, Fountain R, Summers L, Gosselin K. Flipping the classroom to improve student performance and satisfaction. *J Nurs Educ*. 2013;52(10):597-9.
45. Amresh A, Carberry AR, Femiani J. Evaluating the effectiveness of flipped classrooms for teaching CS1. In *2013 IEEE Frontiers in Education Conference (FIE) 2013 Oct 23: 733-35. IEEE*.
46. Wang Y, Christiansen MS. An investigation of chinese older adults' self-directed English learning experience using mobile apps. *Int J Comput Assist Lang Learn Teach*. 2019;9(4):51-71.
47. Zainuddin Z, Habiburrahim H, Muluk S, Keumala CM. How do students become self-directed learners in the EFL flipped-class pedagogy? A study in higher education. *Indones. J. Appl. Linguist*. 2019;8(3): 678-90.
48. Sharifi Ghoortani M, Nadi MA. Structural equation modeling of relationship between self-directed learning, learning styles and learning strategies with academic achievement of English language in public pre-university schools in Isfahan. *Research in Curriculum Planning*. 2016;13(49): 48-60. Persian.
49. Khaknejad H, Mardakhoda Rudmajani F. Teaching in flipped class on the motivation of students' academic achievement in the English language course of the tenth grade in Rashtkhar, *Journal of New Achievements in Humanities Studies*, 2019; 2(15): 85-94. Persian.
50. Bahmani M, Javadipour M, Hakimzade R, Salehi K, Alavi Moghaddam SB. Evaluating the rate of engagement and academic achievement of high school students by using flipped classroom instruction. *Journal of Applied Psychological Research*. 2017;8(2):35-49. Persian.