



The Effect of Implementing Flipped Classroom Model on Critical Thinking and Performance of Iranian EFL Learners in Learning Grammar

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Abstract

The flipped classroom is a teaching approach that can afford additional face-to-face communication with students in the classroom. Although some studies have already investigated the flipped classroom in general, few studies have investigated critical thinking and performance in learning grammar, in particular. The design of the study was quasi-experimental. This research was performed within an English class for six weeks in 2020. Three hundred and sixty English learners were chosen through multistage cluster sampling from two different institutions within the age range of 13-19 who were studying at intermediate and upper-intermediate levels. Eight grammar contents were selected among fifty grammar videos based on the content validity index (CVI) and the content validity ratio (CVR). EPT (English performance tests) and CT (critical thinking) questionnaires were used. The experimental group was educated with the flipped classroom model, whereas the courses were performed based on the present syllabus in the control group. It was realized that there was no substantial discrepancy between the pre-test and post-test scores of the control group, while there was a significant difference between the pre-test and post-test scores of the experimental group. Teachers can be proposed to manipulate the flipped classroom model to boost learners' critical thinking and performance.

keywords: critical thinking, flipped classroom, flipped learning, flipped teaching, performance

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Introduction

The flipped classroom was first mooted as an instructional strategy by Baker in the late 1980s (Segolsson et al., 2017). The educational world has changed its perspective from teaching-centered into learning-centered (Jungst et al., 2003). This disposition shows that learning assumes a key role in every single academic choice (Lombardini et al., 2018). One of the most critical difficulties in the present instructive world is how we can prepare learners to learn well (Wang, 2020). Flipped learning denotes an instructional technique that draws in learners in their learning procedure through cooperative and issue-based learning exercises to build up their basic reasoning and critical thinking aptitudes (Zou, 2020). Despite the fact that teacher-student contact hours do not change, learners can see the instructional materials at home and have more teacher-student commitment in the class. The main goal is to move the instructor-focused on guidance to student-focused on figuring out how to change the educator's work. There is a lack of investigation concentrating on this issue (Hamdani, 2019). To the best of the researchers' knowledge, few studies have examined issue. Traditional instructional techniques have turned out to be insufficient in gathering learning applications. The reason is that students don't feel good and the learning condition isn't proper for them in the conventional guidance framework where the instructor is the focal point of the learning procedure (Cooper, 2014). Students are inactive learners in customary guidance frameworks, making learners careless during the learning process. In such a manner, imaginative learning methodologies can be utilized. Without a doubt, paying more heed to innovation in the learning process will give learners modern skills and rectify the instruction framework by giving genuine training modification (Andujar et al., 2020).

The study on the flipped classroom approach in English institutions is still incomplete, especially research conducted in an Iranian context. Nevertheless, the flipped classroom relates well to the Iranian curriculum and how teachers are supposed to work within the communicative classroom (Shahamat et al., 2019). This main characteristic makes learners study and practice hard, in which the flipped classroom is the basic savior to help them.

This study is to research the effects of the flipped classroom on learners' critical thinking and performance in learning grammar for Iranian intermediate and upper-intermediate EFL learners.

The study investigated the following research questions:

Q1. Does the experience of using a flipped-classroom approach significantly improve upper-intermediate learners' grammatical performance?

Q2. Does the experience of using a flipped-classroom approach significantly improve upper-intermediate learners' critical thinking?

Q3. Does the experience of using a flipped-classroom approach significantly improve intermediate learners' grammatical performance?

Q4. Does the experience of using a flipped-classroom approach significantly improve intermediate learners' critical thinking?

Literature Review

Flipped Classroom

It was first presented as an instructional strategy by Baker in the late 1980s. On account of the advances of personal computer(PC) development, the Internet,

and YouTube in 2006, Baker's considerations have been recognized and framed into what today is known as the flipped classroom. The flipped classroom is an instructional approach that gives the students different opportunities to process instructional materials (Han et al., 2020; Judy & Huang, 2020). In a flipped classroom, learners utilize some sources provided by their teacher prior to classroom presentation, while classroom time is mainly dedicated to group cooperation and problem-solving activities.

The expectation behind the flipped classroom is to keep the close and personal time between the teacher and students so the activity can be used to process the material rather than as in typical talks where the students are latent beneficiaries of data (Awidi, & Paynter, 2019; Bond, 2020; Hamdani, 2019; Hung, 2015; Nicolosi, 2014). The flipped classroom has the same formation as an Instructive classroom. Consequently, the four needs of the communicative classroom are closely related to how one is supposed to work with the flipped classroom method. For instance, as indicated by Chan et al. (2020) and Van Alten et al. (2019), the students and teacher have greater opportunities to use and contextualize the target language in different collaborative learning exercises to highlight the different social uses of language as more time is freed in the classroom.

Performance

Performance is the result and outcome of an individual's effort in an official learning environment that is the main goal of each pedagogical system. It is one of the most important criteria. Performance means the sequence of responses that aim to alternate the environment with definite solutions. The sequence of responses means the respondent's behavior which leads to production (Henderson et al., 2020; Özkurkudis & Bümen, 2019). While the theoretical description of the performance has been provided, the practical definition of this attribution in this study is still vague. Performance, refers to the obtained scores in the final exam in grammar sections, which were obtained after one term of experiencing the flipped classroom environment.

Critical Thinking

Critical thinking and analyzing ideas have always been discussed since ancient times and back to the Greek philosopher era. As it has been mentioned, the origin of critical thinking goes back to Aristotle, Socrates, and Plato's time. While Socrates focuses on subjectivism and the willingness to criticize, which is required for human achievement, Aristotle and Plato worked on the agenda of the significance of logic and critical thinking in achieving freedom (Chance, 1986).

Science and technology have progressed in the 21st century (Andujar et al., 2020). The skills of the 21st century involve countless skills like critical thinking, association, and innovation (Andujar et al., 2020). However, the main thinking skill that is important in the 21st century is critical thinking (Ahadiat, 2019). It is a skill that is required to enhance the thinking ability of the learners (Dooly & Sadler, 2020). Also, it is essential for problem-solving. Taylor et al. (2020) believe that, to solve problems, we need to think deeply to evaluate the problems through the use of existing knowledge and based on critical thinking.

One characteristic of critical thinking is that it starts with comprehending our thinking (Boss & Larmer, 2013; Chen et al., 2014; Elmaadaway, 2018). According to these researchers, we cannot transfer non-propositional knowledge just

by the language, and via speaking to learners; they should learn it practically. It means that how to think is different from what to think about. In utilizing and producing a new language, using its structures and grammar are crucial factors. Comprehending and knowing these structures requires deep and critical thinking to evaluate the problem through the use of grammatical knowledge.

Method

Participants

The participants of this research were 360 English learners aged 13-19 who were studying at intermediate and upper-intermediate levels from two institutions in Zanjan, Iran. They were selected through multiple-stage cluster sampling. Out of 110 institutions in Zanjan province, Iran, researchers selected two institutions. Nearly 30% of students were at intermediate and upper-intermediate levels (N = 5830). Out of this number, about 3485 learners were females and about 2345 were males. Based on Morgan's table, 360 learners were required for the current report (210 females, 150 males). The institutions included the Science and Technology of Kish and the Iran Language Institute (ILI). The exact number of students in the institutions mentioned was 370 in the summer of 2020.

Two classes at the intermediate level and two upper-intermediate classes (based on a placement test) were selected from each institution. As a whole, there were 8 classes, 4 male classes (n = 146) and 4 female classes (214). The Oxford placement test was conducted for the 8 classes as a pretest to have a homogeneous group. Group A was identified as upper-intermediate level students (66 males and 94 females) and Group B as intermediate level students (80 males and 120 females). Students who were able to answer 28-36 questions out of 60 test items were regarded as an intermediate level and those correctly responding 48-55 questions were assigned to the upper-intermediate proficiency level. The learners in the experimental group were taught grammatical points and strategies through flipped classroom by their teacher. Thus, by collaborating with the researcher, the teacher played the role of a facilitator. The participants in the experimental group got familiar with such skills and employed them to enhance their grammatical ability. In contrast, the control group learners were taught the course using traditional approaches for all lessons.

Table 1

Estimation of Sample Size

Z	Confidence Level	Relative Error D	Sample Size N	Volume of Society N
1.96	0.95	0.05	360	5830

Instruments

Oxford Placement Test (OPT). The language proficiency test version 2 including 60 items (such as matching, comprehension text, and multiple-choice questions) was conducted to reach the previously mentioned objectives to confirm the students' similarities. Thirty minutes were offered to the students to reply to the survey questions that were concentrated mostly on reading abilities, grammar, and vocabulary.

Ricketts' (2003) Critical Thinking Dispositions Questionnaire. It was used to measure the intermediate and upper-intermediate EFL learners' critical

thinking disposition. To achieve the goals mentioned before, a test was considered to get feedback from learners. In addition, that feedback was about skills like reading and grammar, etc. The time of the test was about 30 minutes. In the test, there were 33 statements; the lowest and the highest scores were 33 and 145 and the average score was 99. There were 3 subscales of 1. Innovation —> 11 statements 2. Maturity —> 9 statements 3. Engagement —> 13 statements. Each subscale has a coefficient, respectively: Innovation = 0.64, maturity = 0.53, engagement = 0.82, and the coefficient of the instrument was 0.76. The reliability coefficient of the instrument had been reported to be about 0.76 by Pakmehr et al. (2013).

EPT (English Performance Test). In this study for evaluating students' performance, EPT was used. It is validated by Dortaj (2004) for Iranian society. It had 47 questions on a 5 Likert scale. Those with lower than 120 were considered low educational performance, those with more than 175 high performances, and those with a score between 121-174 were considered medium performance. It assesses performance five domains, self-efficacy, emotional impacts, lack of outcome control, time schedule, and motivation. After extracting the data from the questionnaires, the Cronbach's Alpha value of the variables was calculated as follows:

Table 2

The Result of the Cronbach's Alpha Test

Questionnaire	Question number	Cronbach's Alpha
Performance	48	0.981
Critical thinking	33	0.975

Grammar Videos. There were fifty different types of grammar subjects. The researchers chose 8 important topics. Those topics were asked by experts and experienced teachers based on CVR and CVI formulas. Lawsh formula is as follows:

$$\frac{(N_e - N) + 2}{N}$$

$$\text{CVR} = \frac{N_e - N}{N}$$

In this study, students accessed video grammars at home and did exercises in the flipped classroom with teachers' guidance and supervision. Learners watched the grammatical movies at home and the next session teacher taught those contents in the class and they did the exercises and appropriate pair works. It was done for six weeks. Control groups were taught through traditional methods.

Procedures

To administer this research following steps were taken:

Administering the Placement Test. To begin the study, grammar was chosen for eight classes at the Iran Language Institute (ILI) and the Kish Institute of Science and Technology. To have a homogeneous group, the Oxford placement test was conducted for the 8 classes as a pretest. Group A was identified as upper-intermediate level students (66 males and 94 females) and Group B as intermediate level students (80 males and 120 females). Students who were able to answer 28-36 questions out of 60 test items were regarded as an intermediate level and those correctly responding 48-55 questions were assigned to the upper-intermediate proficiency level.

Administering the Pre-test for Group A. In the next stage, some films that have been gathered by researchers based on the upper intermediate course book's content were used. Those films were about the grammatical points including causative structure, infinitives, gerunds, relative pronouns, future perfect, progressive, and phrasal verbs that the researchers gave to the participants. They were asked to watch the film before the teaching session to be argumentative, have more interaction among students and enhance their performance during grammar exercises.

Administering the Pre-test for Group B. In this group, like the previous one, they were given another group of grammatical movies to be watched at home before teaching sessions. Those grammars were chosen based upon the coursebook content for intermediate learners. They were about tenses, conditional sentences, passive voices, and part of speech. Instructors asked students to watch the movies in advance. Afterward, some questions and ambiguities have been provoked in their mind that needs to be solved. Before teaching in the classroom, this background information leads to more critical thinkers and can ask more controversial questions and improve their performance during the session.

Design of the Study

The design of the study was quasi-experimental research. Participants were randomly allocated to two groups; however, this research had an experimental evaluation group design since there was a control group. The key independent variable was the role of a flipped classroom with two levels (intermediate vs. upper-intermediate), and the dependent variables included two dimensions of critical thinking and grammatical performance.

Data Analysis

To examine the data gathered from these applicants, SPSS 22 software was manipulated. A quasi-experimental study was assigned in order to study the effect of the flipped classrooms on learners' critical thinking and performance in learning grammar for Iranian intermediate and upper-intermediate level learners.

Results

Descriptive statistics for the upper-intermediate experimental group was calculated and the outcomes were given in the following:

Table 3

Central Tendencies and Dispersion for Variables in Experimental and Control Groups for Upper-Intermediate Learner (Descriptive Statistics Related to The Variables of Hypotheses 1 and 2 of the Research)

		Mean	Std. Deviation	Minimum	Maximum
Experimental Group	Performance pre	104.16	11.07	92.00	125.00
	Performance post	255.11	28.60	217.00	301.00
	Critical thinking pre	84.28	15.82	65.00	126.00
	Critical thinking post	121.54	10.10	102.00	135.00
	Valid N (listwise)				
Control Group	Performance pre	108.38	7.68	96.00	119.00
	Performance post	157.90	11.98	49.00	257.00
	Critical thinking pre	90.89	9.84	73.00	106.00
	Critical thinking post	88.70	7.90	76.00	105.00
	Valid N (list wise)				

Table 3 shows the central indicators and the dispersion of research in upper-intermediate learners. Mean performance and critical thinking in the experimental group's post-test significantly increased.

Table 4

Central Tendencies and Dispersion for Variables in Experimental & Control Groups for Intermediate Learners (Descriptive Statistics Related to the Variables of Hypotheses 3 and 4 of the Research)

Group		Mean	Std. Deviation	Minimum	Maximum
Experimental Group	Performance pre	114.63	22.05	101.00	198.00
	Performance post	188.92	13.44	170.00	214.00
	Critical thinking pre	71.90	8.86	60.00	89.00
	Critical thinking post	136.14	10.67	119.00	151.00
	Valid N (list wise)				
Control Group	Performance pre	104.04	10.31	77.00	117.00
	Performance post	112.92	12.72	83.00	137.00
	Critical thinking pre	71.13	8.70	60.00	92.00
	Critical thinking post	79.02	7.99	65.00	94.00
	Valid N (list wise)				

Table 4 shows the central indicators and the dispersion of research variables in intermediate learners. Mean performance and critical thinking in the experimental group's post-test significantly increased.

Inferential Analysis

In this study, the Kolmogorov - Smirnov test was utilized to test the hypothesis of normality of the scores.

Table 5

Test the Hypothesis of Normalization of Research Variables at a Higher Average Level in Research Hypotheses 1 and 2)

Group	Variable	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)	Test result
Experimental Group	Performance pre	1.11	0.12	Acceptance of the H ₀
	Performance post	1.17	0.11	Acceptance of the H ₀
	Critical thinking pre	1.15	0.94	Acceptance of the H ₀
	Critical thinking post	1.15	0.12	Acceptance of the H ₀
Control Group	Performance pre	1.28	0.08	Acceptance of the H ₀
	Performance post	1.10	0.21	Acceptance of the H ₀
	Critical thinking pre	1.23	0.10	Acceptance of the H ₀
	Critical thinking post	1.26	0.09	Acceptance of the H ₀

The results of Table 5 show that the assumption of normality of research variables for performing the ANCOVA test in hypotheses 1 and 2 is established ($P < 0.05$).

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Table 6

One-Sample Kolmogorov-Smirnov Test to Test the Hypothesis of Normalization of Research Variables at the Intermediate Level in Research Hypotheses 3 and 4

	Variable	Kolmogorov-Smirnov Z	Asymp. Sig. (2-tailed)	Test result
Experimental Group	Performance pre	1.05	0.20	Acceptance of the H ₀
	Performance post	1.23	0.10	Acceptance of the H ₀
	Critical thinking pre	1.52	0.05	Acceptance of the H ₀
	Critical thinking post	1.122	0.12	Acceptance of the H ₀
Control Group	Performance pre	1.12	0.18	Acceptance of the H ₀
	Performance post	0.75	0.65	Acceptance of the H ₀
	Critical thinking pre	0.52	0.73	Acceptance of the H ₀
	Critical thinking post	0.83	0.55	Acceptance of the H ₀

The results of Table 6 show that the assumption of normality of research variables for performing the ANCOVA test in hypotheses 3 and 4 is established ($P > 0.05$).

Homogeneity of Variances

In this research, the Levene test was applied to investigate the variance of the variance.

Table 7

Homogeneity of the Variances in Hypotheses 1 and 2

	Levene Statistic	df1	df2	Sig.
Performance pre	1.69	1	158	0.08
Performance post	1.42	1	158	0.08
Critical thinking pre	1.07	1	158	0.21
Critical thinking post	1.85	1	158	0.07

The results of Table 7 show that the assumption of homogeneity of variance of research variables to perform the ANCOVA test in hypotheses 1 and 2 is established ($P < 0.05$).

Table 8

Homogeneity of Variances of Intermediate Learners in the Pretest (Examining the Default in Hypotheses 3 and 4)

	Levene Statistics	df1	df2	Sig.
Performance pre	2.62	1	198	0.11
Performance post	0.17	1	198	0.69
Critical thinking pre	1.03	1	198	0.31
Critical thinking post	1.93	1	198	0.23

The results of Table 8 show that the assumption of homogeneity of variance of research variables for the ANCOVA test is set in hypotheses 3 and 4 ($P < 0.05$).

Covariate Run Before Starting the Research

This hypothesis was met before the independent variable and the flipped learning method was implemented.

Homogeneity of Regression Slope

To check the homogeneity of the regression slope, researchers needed to compute the F value of the communication between the covariate and the independent variable. The results of the study were as follows:

Table 9

Regression Slope Homogeneity Test for Upper Intermediate Level in Hypotheses 1 and 2

Source	F	Sig.	Conclusion
group * Performance pre	1.04	0.35	Verify regression slope homogeneity
group * Critical thinking pre	1.61	0.28	Verify regression slope homogeneity

The results of Table 9 show that it is accepted in examining hypotheses 1 and 2 ($P < 0.05$).

Table 10

Regression Slope Homogeneity for Intermediate Level in Hypothesis 3 and 4

Source	F	Sig.	Conclusion
group * Performance pre	2.66	0.09	Verify regression slope homogeneity
group * Critical thinking pre	0.97	0.56	Verify regression slope homogeneity

The results of Table 10 show the homogeneity of the regression slope of the research is established in examining hypotheses 3 and 4 ($P > 0.05$).

The Linearity of the Correlation

To check the linearity of the correlation of the independent variable and the covariate, researchers needed to estimate the F value of the correlation variable. The results of the survey are as follows:

Table 11

The Independent and the Dependent Variable in the Upper-Intermediate Group in Hypothesis 1 & 2

Source	F	Sig.	Conclusion
Performance pre	36.43	0.00	Linear correlation between the covariate and the independent variable
Critical thinking pre	30.15	0.00	Linear correlation between the covariate and the independent variable

The results of Table 11 show that the correlation of the independent variable and the pretest is accepted in hypotheses 1 and 2 ($P < 0.05$).

Table 12

The Linearity of the Correlation of the Independent and the Dependent Variable in the Intermediate Group in Hypotheses 3 and 4

Source	F	Sig.	Conclusion
Performance pre	73.22	0.00	Linear correlation between the covariate and the independent variable
Critical thinking pre	50.93	0.00	Linear correlation between the covariate and the independent variable

The results of Table 12 show that the correlation of the independent variable and the pretest are accepted in hypotheses 3 and 4 ($P < 0.05$).

Testing Research Hypotheses

Hypothesis 1: Flipped Learning Improves Upper-Intermediate Learners' Grammatical Performance. Covariance analysis was run to investigate hypothesis one. The outcomes of the analysis of covariance were listed in the following:

Table 13

The Result of the Analysis of Covariance for Upper-Intermediate Students' Grammatical Performance, the Result of the Analysis of Covariance for Upper-Intermediate Students' Grammatical Performance

Group			Mean	Std. Deviation	F	Sig.
Upper Learners	Performance pre	experiment	104.16	11.07	197.77	0.00
		control	108.38	7.68		
	Performance post	experiment	255.11	28.60		
		control	157.90	11.98		

The results of covariance analysis 13 show that flipped Learning improves the grammatical performance of upper intermediate language learners ($F = 197.77$, $P < 0.01$) and it could be concluded that the mean of the two groups at post-test after adjusting for pre-test scores were significantly different. As shown in the above table, the mean grammatical performance of upper-intermediate learners' in the control group was 108.38 in the pre-test, and 157.90 in the post-test, while the average grammatical performance of upper-intermediate learners' in the pre-test group was 104.16 and in the post-test was 255.11. Thus, it was determined that by excluding the pre-test effect, flip learning improves the grammatical performance of upper-intermediate learners. Based on the above explanation, hypothesis 1 is accepted.

Hypothesis 2: Flipped Learning Improves Upper-Intermediate Learners' Critical Thinking. Covariance analysis was used to test the above hypothesis. The outcomes of the analysis of covariance were listed in the following:

Table 14

The Result of the Analysis of Covariance for Upper-Intermediate Students' Critical Thinking

Group			Mean	Std. Deviation	F	Sig.
Upper-Intermediate Learners	Critical thinking pre	experiment	84.28	15.82	651.23	0.00
		control	90.89	9.84		
	Critical thinking post	experiment	121.54	10.10		
		control	88.70	7.90		

Results of analysis of covariance Table 14 show that flipped Learning improves the critical thinking of upper intermediate level learners ($F = 651.23$, $P < 0.01$). As seen in the above table, in terms of critical thinking, in the pre-test, the mean scores of upper-intermediate learners in the experimental and control groups were 90.88 and 88.70, respectively, while in the post-test, the mean score of upper-intermediate learners in the control group was 84.28 and in the experimental group was 121.54. Taking into account, it was determined that by deleting the pre-test effect, the flipped learning method could improve upper-intermediate learners' critical thinking. Based on the above explanation, hypothesis 1 is accepted.

Hypothesis 3: Flipped Learning Improves Intermediate Learners' Grammatical Performance. Covariance analysis was used to test the above hypothesis. The outcomes of the analysis of covariance are listed in the following tables:

Table 15

The Result of the Analysis of Covariance for Intermediate Learners' Performance

Group			Mean	Std. Deviation	F	Sig
Intermediate learners	Performance	experiment	114.63	22.05	1187.27	0.00
	Pre	control	104.04	10.31		
	Performance	experiment	188.92	13.44		
	post	control	112.92	12.72		

The results of the analysis of covariance in Table 15 show that flipped Learning improves the performance of intermediate language learners ($F = 1187.27$, $P < 0.01$). Thus, it could be concluded that the mean of the two groups at post-test after adjusting for pre-test scores were significantly different. The mean grammatical performance scores of intermediate level learners in the pre-test and control groups were 104.04 and 112.92, respectively, while the mean grammatical performance scores of intermediate learners in the pre-test and control groups were 114.63 and 188.92, respectively. It was deduced that flip learning improves intermediate-level learners' grammatical performance. Based on the above explanation, hypothesis 1 is accepted.

Table 16

The Outcome of the Analysis of Covariance for the Intermediate Learners' Critical Thinking

Group			Mean	Std. Deviation	F	Sig
Intermediate learners	Critical thinking	experiment	71.90	8.86	2263.90	0.00
	pre	control	71.13	8.70		
	Critical thinking	experiment	136.14	10.67		
	post	control	79.02	7.99		

Hypothesis 4: Flipped Learning Improves Intermediate Learners' Critical Thinking. The results of analysis of covariance in Table 16 show that flipped learning improves the critical thinking of intermediate-level learners ($F = 2263.90$, $P < 0.01$). As displayed in the table, the value of F in the covariance analysis for the critical thinking ability of intermediate level students were found to be 2263.90 and since $Sig = 0.000$ was less than 0.05, it was significant at the 0.05 level. Therefore, it could be concluded that the mean scores of the two groups in the post-test, after adjusting the pre-test scores, was significantly different. As displayed

in the above table, regarding critical thinking, the mean score of intermediate level learners in the control group was 71.13 in the pretest and 79.02 in the posttest while the mean score of the intermediate level learners in the experimental group was 71.90 in the pretest and 136.14 in the posttest, it was accepted that flipped learning method significantly improves critical thinking for the intermediate level students. Based on the above explanation, hypothesis 1 is accepted.

Discussion

The first research question was, “Does the experience of using a flipped classroom approach significantly improve upper – intermediate learners’ grammatical performance in learning grammar?” According to the results of the covariance analysis, it was found that the flipped classroom improves upper-intermediate learners’ grammatical performance. Taking into consideration, it was determined that by excluding the pre-test effect, flip learning improves the grammatical performance of upper-intermediate learners. The findings of this study are similar to the study by Luo et al. (2017). Their empirical outcomes showed that learner agency had an important influence on learners’ academic performance. Outcomes in this study show that performance will increase in the flipped classroom. Another investigation was carried out by Wang (2020), matching the impacts of individual vs. group face-to-face class activities in the flipped classroom on learner’s test performances. This study discussed the performance through individual and group face-to-face performances in the flipped classroom. The research showed that the mean test score of learners in face-to-face class performances was more effective than individual face-to-face class performances and the difference across Group 1 and Group 2 was considerable. The flipped classroom model increases the area knowledge of the learners (Hung, 2015) and learners’ success (Baepler et al., 2014; Chen et al., 2014; Liebert et al., 2015; McLaughlin & Rhoney, 2015).

Learners actively take part in the process and their participation in the lessons increases (Nicolosi, 2014; Özkurkudis, & Bümen, 2019; Roach, 2014). Therefore, it can be considered that the achievement obtained in the group where the flipped classroom model was implemented, is due to the aforementioned reasons. The increase in the active participation of students in the lesson is reflected favorably in their performance. This study will be useful for teachers, curriculum designers, and academic departments.

The second research question was, “Does the experience of using a flipped-classroom approach significantly improve upper – intermediate learners’ critical thinking in learning grammar?” The methods used to improve student academic achievement and critical thinking skills in learning have been discussed seriously in the education environment for the past two decades (Washaw & Openshaw, 2011).

The flipped classroom is an important part of general education (Bergmann & Sams, 2012, Sophia Learning, 2013). Flipped classroom effect on student academic achievement and student critical thinking skills in the high school learning classroom has not been suggested in articles, journals, or research studies on this new approach.

As discussed before, Ricket’s (CDTI) questionnaire was used for measuring critical thinking, which includes 33 Likert scale alternatives. Based upon the results of covariance analysis, the flipped classroom was found to improve

upper- intermediate learners' critical thinking. As was revealed in the results, the value of F in the covariance analysis for the critical thinking ability of upper-level students was 651.230. Since $\text{sig} = 0.000$ was less than 0.05, it was significant at the 0.05 level as relates to critical thinking, in the pretest, the mean scores of upper-intermediate learners in the experimental and control groups were 90.88 and 88.70, respectively, while in the post-test, their mean scores were 84.28 and 121.54, respectively implying that critical thinking ability is significantly affected by the flipped classroom environment.

The findings of this research questionnaire is in line with that of Yazici et al. (2020) examined the correlation between critical thinking skills and educational performance and probed the degree to which demographic characteristics could moderate the relationship between the variables of the study. They found that there is an important correlation between them and explored that there are differences across cultures. Also, the results are in acceptance with that of Evseeva, and Solozhenko, (2015) who sought to find out if there was any relationship among self-efficacy, thinking styles, critical thinking, emotional intelligence, and academic achievement in nursing students. They found that the variables of the study are related to academic success. Winch (2020) also investigated the impact of flipped learning on nursery students' critical thinking. In sync with our findings, the results showed some satisfaction in the learning and crucial improvement in the critical thinking aptitude of the learners.

Although the impacts and whether they directly affect students' grammatical progress cannot be accurately described, this current study shows that increased success seems to be determined by three aspects: pre-class activities, in-class activities, and process teaching. The above results clearly show the positive effects on students' grammatical progress in ICT (information and communications technology).

In the first place, the homework such as do a search on media led to many different ways of learning and drew students' attention and change them to be more accountable and self-supporting learners whose activities are dramatically boosting also, stimulate to be taught. The research obtained aligns with Kang's outcome (2015), which showed that homework included video content and diverse teaching programs; considering that students can easily show their interest. Kang's educational tool, a mobile class board, also turns the class atmosphere into a better place.

With more practice and effort in the ICT-aided flipped-classroom, students are more independent and are willing to self-study prior to their classes. Before starting each class training session, learners can answer most of the teacher's questions and get a good score with enough practice. Timely attendance in the classroom ensures regularity and also all students can use the class effectively. Also, the teacher's teaching greatly impacts the student's learning (Evseeva & Solozhenko, 2015; Hung, 2015; Zhonggen & Guifang, 2016).

Secondly, participatory activities in the classroom can satisfy students and increase their motivation to learn. It can also increase their knowledge through tests, educational games, discussion, and writing. This supports Zhonggen and Guifang's (2016) findings of students' satisfaction in the clicker-aided flipped classroom. Denprapat and Chuaychoowong (2016) stated that this increases motivation and it is an opportunity for students to express different abilities and learn different skills.

Eventually, in a not-completely new learning environment, the teaching method was simple, structured, and sufficient for the students to adapt themselves. This current study also verified the results of Denprapat and Chuaychoowong (2016), which suggested that one element of English language enhancement was the teaching process. The teaching procedure was not only simple but also systematic in this current study. As a result, each step the teacher asked them to complete could be understood by the students. Each step was systematically connected from one to another, i.e. after the presentation to practice and later develop. The teaching proceeding by incorporating the flipped model, communicative approach, and technology was neither too conventional nor too new.

English language teachers would benefit from the results of the study as well. They should consider their teaching strategies and methods and find creative ways to enhance students' critical thinking in the flipped classroom to get better results.

The third research question was, "Does the experience of using a flipped classroom approach significantly improve intermediate learners' grammatical performance in learning grammar?"

According to the results from the covariance analysis, a flipped classroom improves intermediate learners' grammatical performance. The value of F for learners' grammatical performance at the intermediate level was 1187.27. Since Sig = 0.000 was less than 0.05, it was significant at $P < 0.05$., the mean scores for the grammatical performance of intermediate level learners were 104.04 and 114.63 for the control and experimental group, respectively, while in the posttest, their mean scores for the grammatical performance were 112.92 and 188.92 for the control and experimental group, respectively. It was assumed that flipped learning improved the grammatical performance of intermediate learners.

All of the students in control and experimental classes scored low on the grammar pretest (62.68 and 65.85 and got an equal score in the pretest. After a while when they join the flipped classes, they could be able to improve their English workmanship. As Farah (2014), many scientists proved that this kind of classes could affect students' scores by providing enough time to learn and repeat English grammar. Students also in such classes have more time to focus on what grammar is about and what concept and application it wants to convey? Other specialists such as Mason et al. (2013); Murphree (2014); Strayer (2012); and Wilson (2013), found that learners will get better by flipped learning.

Surveys about post-tests indicate that adopting the flipped classroom strategy appears beneficial in developing students' grammar knowledge, thus the score of the experimental group was more than that of the control group. This survey was compatible with other cultural and educational contexts such as Kang (2015) and Han (2015), whose studies perceived that the flipped classroom developed students' grammar knowledge compared to other instructional methods. Particularly encountering the unusual challenges of the Saudi context, analyzing students' reactions in this study revealed that flipping English grammar classes could assist in solving some of the non-problematic issues of Saudi secondary schools found by Al-Seghayer (2015) and Rahman and Alhaisoni (2013). The results of the study are consistent with those of Dehghanzadeh and Jafaraghaee (2018), and Uzunboylu and Karagozlu (2015).

The results of Hung's (2015) and Kang's ((2015) studies significantly confirmed and showed the effect of the flipped classroom on the English progress of

first-year students. Similarly, Zhonggen and Guifang (2016), and Denprapat and Chuaychoowong (2016) confirmed the progress of both groups in the post-test and all of these significant improvements have been reflected in the findings of Liu (2016), Denprapat, and Chuaychoowong (2016). This study has demonstrated the possibility of completing the class model to facilitate the English language learners and has confirmed that this sheet model can be used by combining technology at different levels of English language courses.

Flipped learning created an environment for cooperative learning, which allowed what Crouch and Mazur (2001) describe as an opportunity for participants to engage with one another under the instructor's supervision effectively. The pre-class preparation resulted in students gaining the skills to deal with complex challenges and it provided them with some knowledge to share and questions to ask in class.

The participants experienced other benefits of learning grammar through flipped learning. Most students declared that they could retain the knowledge they gained from their grammar course and achieve better course grades. Another effect of flipped learning was related to learning beliefs. The majority of the students believed their role as students changed. They felt they could share knowledge with their teacher and their peers. Moreover, when asked about the possibility of using flipped learning in other courses, more than half of the students confirmed they were able and willing to do so. Finally, the participants were also asked about any signs of autonomous learning. Around half of the students claimed they did not completely rely on their teacher to find additional and related websites. They independently explored the Internet to search for more information related to their grammar course. This is consistent with Amiryousefi's (2019, p. 10) claim that flipped learning can "enhance students' self-study skills and autonomy."

The study shows that students learning in the flipped classroom make themselves more cooperative and raise their motivation and joy in grammar courses. Thus, they can learn faster and it is vivid that they would like to learn more. Also, such findings can be ascribed to the fact that utilizing Flipped classroom with the experimental group raised their interactivity and cooperation and their inspiration to memorize, which increased their satisfaction and adore using the learning language structure.

In addition to increasing the motivation of English learners, the researchers realized both the control group and the experimental group had completely different atmospheres. On the one hand, by accepting that grammar is a difficult subject to learn that requires deep concentration and understanding, the students in the control group showed a lack of interest and boredom. On the other hands, the students in the class with the experimental group experienced learning grammar through the flipped classroom, and the active and positive atmosphere of their classes led to their greater interest and participation. As an inference from the first hypothesis, we conclude that the flipped classroom has a direct and positive effect on students' progress in grammar due to its relaxed atmosphere. These findings from the present study will be useful for teachers, curriculum designers, and academic departments.

The fourth research question was "Does the experience of using a flipped classroom approach significantly improve intermediate learners' critical thinking in learning grammar?"

According to the covariance analysis results, flipped classrooms improve intermediate learners' critical thinking. These findings imply the effectiveness

of flipped classrooms in promoting students' critical thinking and thereby, critical thinking skills. Previous studies also reported that the flipped classroom was associated with positive outcomes. The findings of this research are in line with Coates (2007), Jungić et al. (2015), Kong (2015), and Lai and Hwang (2016), who came up with similar results.

According to a study by Johnson and Renner (2012), different results were obtained in teaching computer science in the flipped classroom. Therefore, according to the results, due to the lack of students' acceptance of the new method and their insistence on traditional methods, it is inferred that this is just an unsuccessful attempt at the flipped classroom teaching method in their research and cannot be applied. As reported by our participants, one of the disadvantages of flipped classrooms was the limited amount of time for teacher's lecturing in the classroom.

Conclusion

Based on the current study findings, the following conclusions were derived from the effect of the flipped classroom on the performance and critical thinking of Iranian EFL learners in learning grammar:

1. The flipped classroom proved more useful and more advantageous than the traditional method for learning English, mainly grammar.

2. Flipped classrooms give students a better opportunity for success and have better efficiency in learning English.

3. A flipped classroom increases the amount of students' learning activities and collaboration.

4. In the flipped classroom, students are more relaxed and amused, which improves their learning and understanding of the new language.

5. It increases the discussions and communications of the students with each other, they feel more relaxed and free in the class and it decreases the dominance of the teacher.

Limitations of the Study

The present study suffered from limitations beyond the researcher's control and, thus, may restrict the study's conclusions. Some other limitations may have occurred, which are collected as follows:

1. All learners do not access the internet and computer easily, and they have to use computers in public sites that would threaten the privacy of flipped classrooms.

2. The best performance in a flipped classroom depends on learners' motivation. Demotivated learners in these kinds of classes may perform lazily.

3. Learning must be done indefinitely because long-lasting learning in the flipped classroom may slow the learning speed and learners' interaction.

Delimitation of this Study

Some delimitations in this study threatened the generalizability of the results. The subjects of this research were Iranian students who were selected from Zanjan city. Thus, care should be taken to the generalizability of this study to other nationalities.

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