Proactive Form-Focused Instruction in a Flipped Classroom: Implicit and Explicit Grammar Knowledge Development and Retention

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Abstract

The present study investigated the possible effects of proactive form-focused instruction on Iranian EFL learners' explicit and implicit grammar knowledge improvement in a flipped and a traditional class and also examined the effect of flipped class on explicit and implicit knowledge retention. Two classes were randomly assigned to an experimental (n = 31) and a control (n = 28) group. The former received proactive form-focused instruction through metalinguistic explanation in a flipped class, whereas the latter attended a traditional grammar class. Two implicit and two explicit knowledge tests were used to evaluate the learners' explicit and implicit grammar knowledge development and retention. A set of pretests and two sets of posttests were administered immediately and four weeks after the last treatment session. Two mixed 3x2 multifactorial ANOVAs and *post hoc* tests were run to spot the differences in the measures between and within the groups. The results showed that both classes improved significantly in terms of learners' implicit and explicit grammar knowledge.

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Furthermore, the experimental group showed a higher rate of knowledge retention. The findings can help and ensure language program designers, educational policymakers, and language teachers to capitalize on flipped courses to teach grammar effectively and help language learners retain both explicit and implicit grammar knowledge longer.

Keywords: explicit, flipped, form-focused, implicit, retention

Introduction

Numerous studies in the literature have investigated Form-Focused Instruction (FFI) and the role it may play in Second Language (L2) development (e.g., Khezrlou, 2021; Toni & Hassaskhah, 2018; Trahey & Spada, 2020). The general theme that has emerged indicates it can affect L2 acquisition positively, as supported by several studies and meta-analyses (e.g., Kang et al., 2019; Saito, 2013; Spada, 2011). However, most previous studies have been conducted in traditional face-to-face classes (e.g., Lee, 2021; Lindseth, 2016; Xu & Li, 2021), and little information exists about the effectiveness of FFI in technology-enhanced language learning environments, the importance of which is becoming increasingly apparent during the COVID-19 pandemic lockdown. Particularly, the literature is characterized by a dearth of studies focusing on FFI in technology-enhanced learning environments in an Iranian context where despite the widespread use of digital tools and social media, the integration of technological equipment in the educational contexts is unsatisfactory yet (Badrkhani, 2021, Rassaei, 2017). This weakness has been referred to in Rassaei (2017) when he says "... in Iran where despite mounting interest in CALL, the incorporation of digital and technological tools in educational contexts is still in its Infancy" (p. 2).

One of the educational environments supported by technology is the flipped class that has widely been studied in recent years. Studies on it, especially in Iran, have mainly focused on its possible effects on language proficiency, students' perceptions, opinions, motivation, engagement, critical thinking, self-efficacy, and autonomy, teachers' perceptions and views as well as comparison between a traditional class and a flipped class (e.g., Afzali & Izadpanah, 2021; Amiryousefi, 2019; Fathi & Rahimi, 2020; Izadpanah & Afzali, 2021; Lee & Wallace, 2018; Nourinezhad et al., 2022).

This new pedagogical approach can increase the input frequency by

engaging students in various educational activities in which the target structures can be incorporated. Research has also shown that technology-enhanced learning environments can increase learners' motivation as well as engagement with content that, in turn, can facilitate deeper understanding, improve memory performance, and enhance knowledge retention (Bouwmeester et al., 2019; Francis, 2017; Semb & Ellis, 1994; Woolfolk & Margetts, 2016). Because a flipped class seems to have the potential to provide these benefits, it is expected that knowledge acquired in a flipped class will be retained longer. However, in the literature, there are not many studies that have documented the direct effect of technology-enhanced learning environments on knowledge retention. This is particularly more evident in research on flipped classes.

Additionally, the effect of explicit instruction on enhancing implicit and explicit knowledge of an L2 has been extensively studied recently (e.g., Akakura, 2012; De Graaf, 1997; Ellis, 2004; Ellis, 2017; Li et al., 2019; Xu & Lyster, 2014). Nevertheless, the extent to which explicit instruction may yield explicit and/or implicit knowledge is still a controversial issue. There is a complex relationship between implicit/explicit instruction, learning, and knowledge. The relationship between these concepts is not as direct and straightforward as some expect and merits further research. Explicit language learning, which often results in metalinguistic rules, "is necessarily a conscious process and is generally intentional" (Ellis, 2009, p. 7), whereas implicit learning occurs without awareness when learners are immersed in a considerable amount of input (Ellis, 2009). Thus, it seems that implicit knowledge acquisition need more time (DeKeyser, 2003) and requires a larger amount of input. In addition, several researchers have argued that explicit learning might result from attention to L2 forms, negative evidence, and explicit instruction (e.g., Lichtman, 2016), whereas some others believe that consciously guided practice is one of the pedagogical strategies which can lead to unconscious implicit knowledge (e.g., Ellis, 2008). Therefore, so far, the results of investigations seem to be inconclusive. By increasing the intensity of instruction, exposing students to more input, and using a range of instructional activities inside and outside the classroom, flipped class is likely to have a contributing role in promoting students' both implicit and explicit knowledge that seems to be the primary goal of L2 instruction. Most, if not all, research on the effect of flipped class on knowledge

retention has been conducted in medicine (e.g., Bouwmeester et al., 2019; Graham et al., 2019) and it seems that the language teaching field suffers from a lack of research in this area. Thus, the present study has a pioneering role in investigating the effect of a flipped class on the retention of English grammar knowledge. In addition, as mentioned above, most research on form-focused and explicit instruction have been conducted in traditional classes.

Given the foregoing issues, the present study was intended to examine and compare the possible effects of explicit instruction on students' implicit and explicit knowledge of grammar in both flipped and traditional courses in an Iranian higher education context. In addition, it sought to gain further understanding of the flipped class effect on English grammar knowledge retention.

Literature Review
Flipped Classroom

Nowadays, technology has turned into an integral part of language learning and teaching environments, changing the ways instruction is fulfilled. One of the fairly new educational innovations is the flipped classroom, which as a type of blended learning, can be employed to provide learners with various types of instruction. The concept of a flipped class is simply defined as "that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class" (Bergmann & Sams, 2012, p. 13). Thus, it reverses or "flips" the regular method of teaching by delivering instruction to students at home through prerecorded video lectures, podcasts, slides, and texts and moves the homework phase into the classroom in which students engage in assignments, problem-solving activities, discussions, games, analyses, mastery quizzes, and face-to-face interaction with peers and teachers (Roehling, 2018), whereas the teacher "instead of being the 'sage on the stage,' functions as a 'guide on the side,' facilitating learning in less directive ways" (King, 1993, p. 30).

A brief literature review shows that the flipped class has mainly been used in fields such as mathematics, engineering, statistics, technology, science, and medicine (e.g., Clark, 2015). In addition, it has recently been adopted in the fields of teacher education and language teaching (e.g., Turan & Akdag-Cimen, 2020) and widely utilized for teaching different language components and skills (Kang, 2015;

Webb & Doman, 2016). The general theme on the use of flipped instruction in different fields suggests that it can result in improved academic performance, positive students' perception, increased engagement, enhanced motivation, and autonomy (e.g., Cilliers & Pylman, 2020; O'Flaherty & Phillips, 2015; Zainuddin & Perera, 2019). Therefore, it appears to be a potential pedagogical strategy for teaching a language. Furthermore, previous investigations show that only a few studies, mainly in the fields of medicine and mathematics, have examined its possible effect on reducing the rate of memory loss and enhancing knowledge retention (e.g., Bouwmeester et al., 2019; Morton & Colbert-Getz, 2016) and the effect of a flipped class on linguistic knowledge retention has not been studied yet in the field of language teaching. However, the possible effects of this type of class on learning English grammar in EFL contexts have been examined in a number of papers, some of which will be cited in *Flipped Classroom and FFI.*

Explicit and Implicit Knowledge and Instruction

Another major theme in SLA research is the explicit-implicit instruction dichotomy. Explicit instruction involves rule explanation (Housen & Pierrard, 2005) and encouraging learners to develop "metalinguistic awareness of the rule" (Ellis, 2009, p.17). Implicit instruction, however, is intended to help learners deduce grammar rules without awareness by providing them with sufficient exemplars of a rule (Ellis, 2009). These two types of instruction are further categorized into reactive and proactive. The former occurs mostly as corrective feedback to focus learners' attention on the target form during interaction (Lyster, 2007), whereas the latter involves "preplanned instruction designed to enable students to notice and to use target language features that might otherwise not be used or even noticed in classroom discourse" (Lyster, 2007, p. 44). Furthermore, "explicit L2 knowledge is the declarative and often anomalous knowledge of the phonological, lexical, grammatical, pragmatic, and sociocritical features of an L2 together with the metalanguage for labeling this knowledge. It is held consciously and is learnable and verbalizable" (Ellis, 2004, pp. 244-5), but implicit language knowledge, which cannot be normally verbalized, is internalized subconscious knowledge tapped into by real-time or spontaneous language tasks (Ellis, 2009).

A review of previous research indicates that implicit instruction generally

seems to be less effective than explicit instruction in helping learners to acquire L2 forms (e.g., Akakura, 2012; De Graaff, 1997; Kang, et al., 2019; Norris & Ortega, 2000). A number of studies have also shown that explicit knowledge of grammar can assist language learners in noticing a target form and gradually acquire it so that it changes into implicit knowledge used for spontaneous production (Ranta & Lyster, 2018). Akakura (2012), for example, investigated how explicit instruction can affect L2 students' implicit and explicit knowledge of English articles and found enduring effects for explicit instruction on explicit and implicit knowledge. In another study, De Graaff (1997) examined the effect of explicit instruction, complexity, and morphology/syntax on the acquisition of four L2 structures. His findings showed that explicit instruction promotes L2 acquisition. In a more recent study, Xu and Lyster (2014) focused on the possible differential effect of explicit FFI on using morphosyntactic forms in L2 oral production. They reported that FFI improved the target form use and its effect was moderated by the regularity and complexity of the morphosyntactic forms.

On the other hand, several studies have questioned the facilitative role of explicit instruction in L2 acquisition. Li et al. (2019), for example, studied the effect of pre-task explicit teaching on a focused task and indicated that it resulted in negative global effects on the learners' L2 production. Likewise, Sanz and Morgan-Short (2004) studied the potential effect of computer-assisted explicit instruction on learning Spanish word order and concluded that explicit instruction may not necessarily promote L2 acquisition. Previous studies also indicate the effectiveness of explicit instruction depends upon several factors like the target structure complexity, its availability in non-instructional input, and instruction intensity (Ellis, 2002; Hulstijn & de Graaff, 1994). A flipped classroom can provide students with more time and opportunity, in the form of activities carried out inside and outside the classroom, to learn the intended topics. Thus, it appears to have enough potential to increase the amount and probably the effectiveness of explicit instruction, compared to a traditional class.

Flipped Classroom and FFI

Whereas most previous studies of FFI were carried out in traditional L2 classes, many studies have looked into the effects of various forms of FFI in

technology-enhanced courses (e.g., Rassaei, 2017). However, compared to other forms of technology-enhanced classes little experimental research has been conducted to study the effects of FFI in a flipped class. Asaka et al. (2018) designed a study in which a flipped class was employed to teach English present progressive and regular verb past tenses to a group of Japanese high-school students. The results showed that the flipped class had improved the students' grammar knowledge and speaking ability. However, when the outcome was compared with that of a control group that had received traditional instruction the difference was not statistically significant. Noroozi et al. (2020) also studied the effects of a flipped class on Iranian EFL learners' acquisition of English conditionals. Their findings implied that explicit instruction in the flipped class was more helpful than explicit instruction in a regular class on both immediate and delayed posttests. In addition, Bezzazi (2019) examined the effect of a flipped class on EFL learners' grammar knowledge development. The present, past, present perfect tenses, conditionals types 1 and 2, and the passive voice were taught and tested over 10 weeks. The results indicated that the flipped class was more effective than the regular instruction regarding teaching English grammar. Kang (2015) also compared two general English courses in a regular and a flipped classroom. Pre/Post-tests were used to compare the students' grammar and vocabulary knowledge before and after the instruction. The findings suggested that only flipped instruction resulted in statistically significant changes in both lexical and grammatical knowledge. Similarly, Webb and Doman (2016) studied the effect of a flipped class on the students' grammar knowledge. Their results showed that students in the flipped group outperformed their counterparts in the control group. Bulut and Kocoglu (2020) also evaluated the effect of a flipped class on EFL students' grammar knowledge and concluded that the flipped group's mean score was higher than the control group's and the difference between them was statistically significant. In another study conducted in an Iranian EFL context, Izadpanah & Afzali (2021) investigated the possible effect of a flipped class on critical thinking and grammar knowledge development. The flipped class was employed to teach the experimental group whereas the control group received instruction using the traditional way of teaching grammar. At the end of the study the flipped class proved to be more effective than the other one.

In contrast, Liu et al. (2019) used a student response system in a flipped

class to teach English grammar. They found that students' self-efficacy, class participation, learning motivation, and engagement in activities improved in the flipped classroom, whereas it proved ineffective in increasing students' grammar knowledge. As the literature suggests studies devoted to the flipped class effect on grammar knowledge development have resulted in inconclusive and mixed results. Furthermore, the grammar knowledge reported in these studies has generally been treated as a unitary construct and its quantity depends heavily on the tests used to measure it. To deal with the gaps mentioned above, the present study seeks to answer the following research questions:

1. Is there a statistically significant difference between the performance of students who received FFI in the flipped class and that of students who were instructed in the traditional class on explicit and implicit grammar knowledge posttests?

2. Is there a statistically significant difference between the performance of students who received FFI in the flipped class and that of students who were instructed in the traditional class on explicit and implicit grammar knowledge delayed posttests?

Method

Participants

Two intact classes including a total of 59 university freshmen studying English as a foreign language at two branches of Azad University in Iran participated in the study. They were selected on the basis of the convenience sampling method. All the participants were Iranian students with Farsi as their first language. Out of the 59 students, 41 were female and 18 were male undergraduates whose ages ranged from 19 to 31($M = 22$). Both classes, which were taught by the same instructor, had to take a compulsory grammar course during the second semester of the 2019-2020 academic year. Only freshmen at the pre-intermediate level were selected in an effort to ensure that they had not yet acquired the target structures. They also completed consent forms and hereby declared their agreement to participate in the study.

Instruments

Two implicit knowledge tests (a Timed Grammaticality Judgement Test

(TGJT) and an Elicited Imitation Test (EIT)), two explicit knowledge tests (an Untimed Grammaticality Judgement Test (UGJT) and a Metalinguistic Knowledge Test (MKT)) and the Oxford Quick Placement Test (OQPT) were employed for the purposes of the study. Several previous studies have offered evidence on the construct validity of the explicit and implicit measures (e.g., Bowles, 2011; Ellis, 2009; Ellis & Loewen, 2007). In addition, four experienced English language teachers evaluated the content of the tests to ensure their content validity. Then, modifications were made in the test items to take care of their opinions.

OQPT. The OQPT, as a standard test that enjoys an acceptable level of validity and reliability, was used to determine the students' language proficiency level and help the researchers to select the participants. This is a paper-based version of the electronic Oxford Placement Test for learners of English. The OQPT consisted of 40 items. Its reliability measured by Cronbach's Alpha was $\alpha = 0.79$.

TGJT. The TGJT used as an implicit knowledge test included 25 items distributed randomly and displayed using PowerPoint slides. Of the 25 items, 13 statements were ungrammatical and 12 were grammatical. The amount of time allowed for the sentences varied between 6 and 9 seconds depending on each sentence length. Each correct item received 2 points while an incorrect or unanswered item was given a zero. An example of the sentences used in the TGJT is given below:

If I had seen him, I would have told you. *[Used in the delayed posttest]*

UGJT. The UGJT was constructed to tap the students' explicit knowledge of the target structures. This pen-and-paper test was identical to the TGJT in terms of the number of questions and grammar points examined. However, the number of ungrammatical and grammatical sentences was different. Of the 25 items, 11 were grammatical and 14 were ungrammatical. The participants were given an answer sheet including the instructions as well as the statements and were asked to judge them in terms of grammaticality without any time limits. Correct answers were given 2 points and incorrect ones 0 point.

MKT. The MKT designed to operationalize the construct of explicit knowledge comprised 25 items, too. Each item included two sentences, one of which was underlined and involved a grammatical error in using the target structures. The test-takers were asked to read the items, write down the grammatical

rules being violated in either English or Farsi, and correct the error. There was no time limit to answer. Students were given one point for stating the rule and one point for correcting the error. However, no score was assigned to only correcting the errors but not describing the rules. The following is a sample of sentences used in the MKT test.

We're out of the sugar. Put some cream in your coffee. *[Used in the immediate posttest]*

EIT. Finally, the EIT consisted of 25 belief statements involving 15 ungrammatical and 10 grammatical sentences. It was administered during one-on-one meetings between the researchers and the students who were asked to listen to 25 statements one at a time on a cellphone, indicate their opinion on an answer sheet which included "*Agree*", "*Disagree*", and "*No Idea*" options for each statement, and immediately repeat the statements in correct English. Each ungrammatical statement included only one error and each correct repetition was awarded two points. All the students' responses were audio-recorded for later analysis. A sample of the statements is given below.

Millions of people killed by cancer last year. *[Used in the pretest]*

Three parallel versions of each explicit and implicit test were developed to be used as pretests, immediate and delayed post-tests. The correlations between the control group's scores in the pretest and posttests were estimated

Table 1

Test-Retest Reliability Coefficients

Test	Pre - $Post_1$	Pre- $Post_2$	$Post_1$ - $Post_2$
TGJT	0.91	0.88	0.89
UGJT	0.77	0.87	0.82
MKT	0.84	0.81	0.96
EIT	0.86	0.88	0.97

Note. Pre = Pretest, $Post_1$= Immediate post-test, $Post_2$= Delayed post-test

for each implicit and explicit test to determine their test-retest reliability coefficients. Table 1 presents reliability coefficients for each test.

Data Collection Procedure

Pretreatment Stage

In order to gather the necessary data, the following procedure was followed. First, a group of 64 undergraduate TEFL students who were members of two different classes took the OQPT administered one week before beginning the instruction. Fifty-one students who scored between 18 and 30 ($M = 23.84$ and $SD = 5.5$) were selected as the participants at the pre-intermediate level. Then, the two classes were assigned randomly to a control ($n = 28$) and a treatment group ($n = 31$). Four days before starting the instruction, both groups took four pretests over three successive days. Afterward, both received instruction on the same grammar topics but in different ways for 11 weeks. The classes were held twice a week for both groups and every session lasted about 105 minutes, with a 10-minute break in between. The textbook (i.e., *English Grammar in Use*), instructor (i.e., one of the researchers), number of sessions ($n = 22$), and language of instruction (i.e., a mixture of Persian and English) were the same for both groups. A detailed description of the treatment and the control conditions follows. In addition, Figure 1 vividly depicts the data collection procedure followed in the present study.

Treatment Condition

Out-of-Class Phase. The researchers selected suitable videos through an extensive review of language learning websites. The main selection criteria were language, clarity, length, quality, pacing, and tone. In order to support the out-of-class part of the curriculum, the course content was delivered via *WhatsApp* to the students. Three or two days before holding each class the materials were sent to a WhatsApp group created for the purposes of the study. First, the videos and supplementary files including webpages, texts, and PowerPoint slides were uploaded one after another. Then, the day before the following session, a set of fill-in-the-blank or multiple-choice questions on the newly taught grammar structures were sent to the group. Each student was required to answer them and send back the answers to the instructor. They were informed that completing the tests constituted a portion of their total score.

Figure 1

Data Collection Procedure
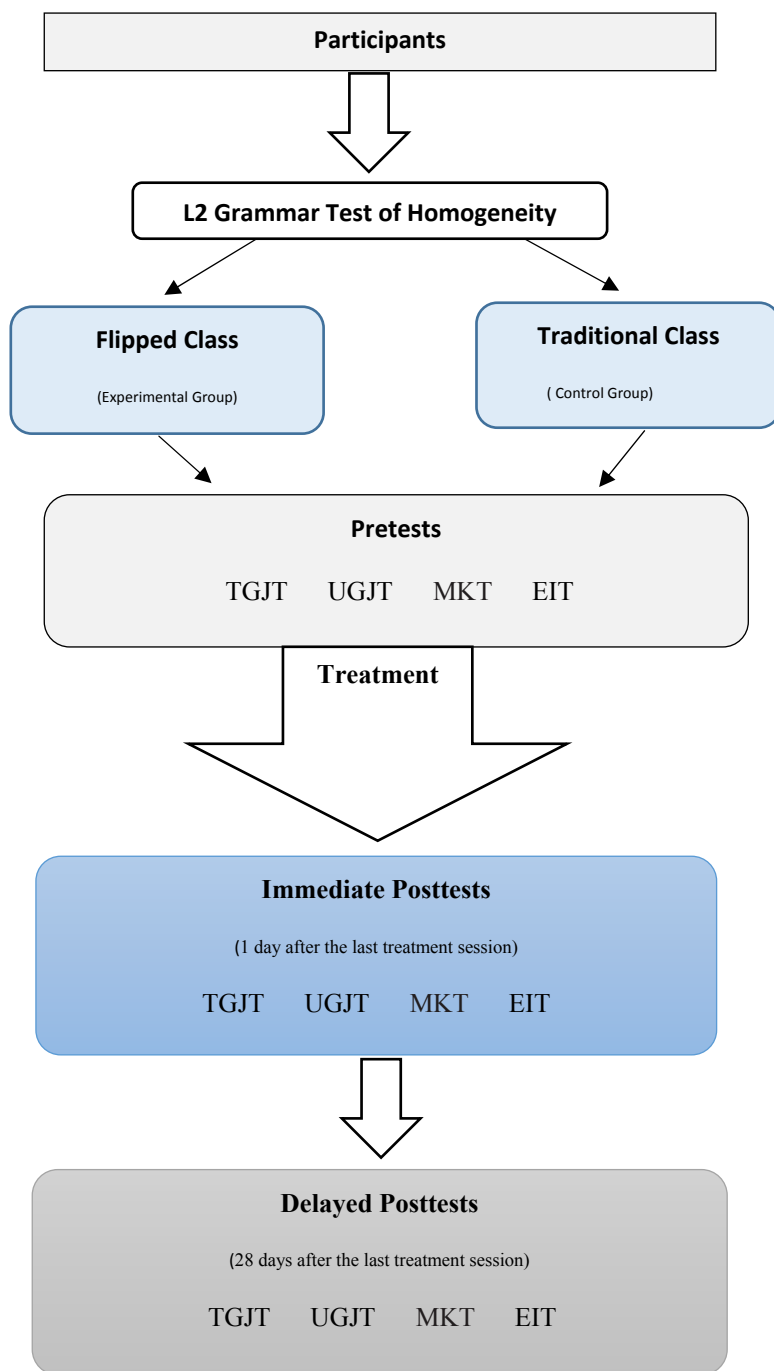
In-Class Phase. Each class normally began with a brief review of the grammar points already presented by videos to clear up the students' likely problems and clarify any misunderstood points. Sometimes they had to take a short impromptu quiz on the target grammar points at the beginning of each class to ensure that all the students had watched the videos and studied the materials.

Then, they were asked to do the textbook exercises in pairs and volunteers took a turn reading out the completed exercises. In case of any problems, the instructor, in collaboration with other students, tried to remind them of the relevant grammar point. Afterward, the students, in pairs, would write English sentences using the new grammar structures, read them out to the class, and receive verbal feedback from peers and the instructor. Then, they were divided into groups of four and shown a series of pictures that depicted an event or simple story. Each group was required to write a brief story about them. The pictures and instructions were chosen in such a way that they could elicit the desired structures. After that, each group was given a chance to present their story to the class and get feedback from their classmates and the instructor who would often write their errors on the board and corrected them collaboratively. It should also be noted that some grammar games would replace the picture-cued storytelling task every other session. While they were completing the tasks, the instructor encouraged them to help and correct each other within the groups. As the final step, the group members would read their sentences aloud and get feedback. Although about ten grammar topics were presented during the semester, the study only focused on the passive voice, conditionals, and articles for practical problems and measurement issues.

Control Condition

The learners of the control condition attended a lecture-based grammar class twice a week, too. Each class began with a brief review of the key points presented during the previous session and proceeded with completing and checking the textbook exercises. Then, the instructor delivered a lecture during which new grammar points were presented explicitly in both Farsi and English. Afterward, a number of examples and further explanation were presented to the students. Next, he asked them to write a few sentences using the new structure. After that, students volunteered to read their sentences and received feedback from their classmates and

the instructor. Later on, a number of the book exercises were completed and the rest were assigned as homework.

Posttreatment Stage

Both groups took the immediate and delayed posttests a day and 28 days after the last class session, respectively. A review of the literature revealed that the time interval between delayed retention tests and the instruction is suggested to be two weeks or more (Haynie, 2007). The order of administering the tests was altered in the pretests and posttests to minimize the order effect.

Data Analysis

First, the students' scores on the TGJT and EIT were added together and an implicit knowledge total score was calculated. Similarly, their scores on the UGJT and MKT were added up and an explicit knowledge total score was computed for each participant, too. It should be noted that all reported total scores on pretests and posttests were out of 100. Then, to show that both groups were homogeneous regarding their explicit and implicit grammar knowledge before treatment, the participants' raw scores in the pretests were obtained, descriptive statistics were calculated for both groups, and two independent samples *t*-tests were run. Next, two mixed 3x2 multi-factorial ANOVAs and *post hoc* tests were carried out to answer the research questions. *SPSS 21* and *GPower 3.1* were employed to perform the analyses.

Results

Table 2 that provides descriptive statistics for learners' pretest, posttest, and delayed posttest scores in the explicit and implicit knowledge tests shows scores in both groups increased from the pretests to the posttests but deteriorated from the posttests to the delayed posttests. Previous research (e.g., Ebbinghaus, 1964) has shown that such reduction seems to be a natural phenomenon that occurs over time.

In addition, Figures 2 and 3 display changes in the groups' mean scores of implicit and explicit knowledge tests. Changes in scores from the pretests to the immediate posttests and from the immediate posttests to the delayed posttests represent learners' knowledge acquisition and knowledge retention, respectively.

The line graphs show that students in the flipped class obtained higher scores on both explicit and implicit tests. However, two independent samples t-tests on pretest scores showed no significant difference between the groups in both explicit, $t(47.73) = -.38$, $p = .70$ and implicit knowledge test scores, $t(57) = -1.13$, $p = .26$. This suggests that the two groups were homogenous before initiating the treatment.

Furthermore, two mixed 3x2 multi-factorial ANOVAs were carried out. Results showed that on the immediate posttests no statistically significant difference was found between the two teaching methods in improving the learners' explicit and implicit grammar knowledge, F_{exp} (1, 57) = 3.17, $p = .08$ and $F_{imp}(1, 57) = .88$, $p = .35$. However, the results indicated that there was a significant interaction effect between time and teaching method. This implied that students' explicit and implicit grammar knowledge improved differentially over time as a result of employing different teaching methods, $F_{exp}(1.58, 90.20) = 21.46$, $p < .001$, $\eta^2 = .27$ and $F_{imp}(1.58, 90.32) = 29.77$, $p < .001$, $\eta^2 = .34$.

Table 2

Descriptive Statistics of Explicit and Implicit Knowledge Test Scores

Knowledge			Pretest		Posttest 1		Posttest 2	
	Group	n	M	SD	M	SD	M	SD
Explicit Knowledge	Flipped	31	41.07	8.85	69.45	8.46	59.42	9.10
Scores	traditional	28	42.17	12.66	62.98	12.37	50.12	14.55
Implicit Knowledge	Flipped	31	32.93	11.70	61.66	10.30	55.48	10.77
Scores	traditional	28	36.76	14.26	57.39	12.90	47.13	14.75

Independent t-tests, as *post hoc* tests, revealed that the flipped and the traditional groups only significantly differed in explicit and implicit delayed posttests, t_{exp} (44.45) = 2.90, $p < .016$ and t_{imp} (57) = 2.50, $p < .016$. In addition, the within-group main effect of time was also significant in both explicit and implicit tests, F_{exp} (1.58, 90.20) = 450.33, $p < .001$, $\eta^2 = .88$ and F_{imp} (1.58, 90.32) = 488.72, $p < .001$, $\eta^2 = .89$. Two repeated-measures one-way ANOVAs were run to examine the explicit knowledge scores across the three test conditions for both flipped and traditional groups.

Figure 2

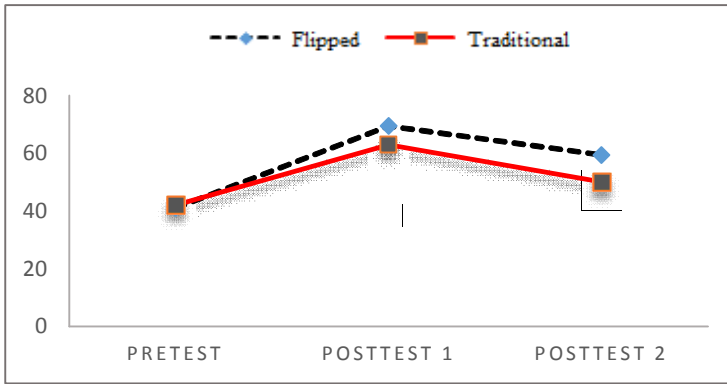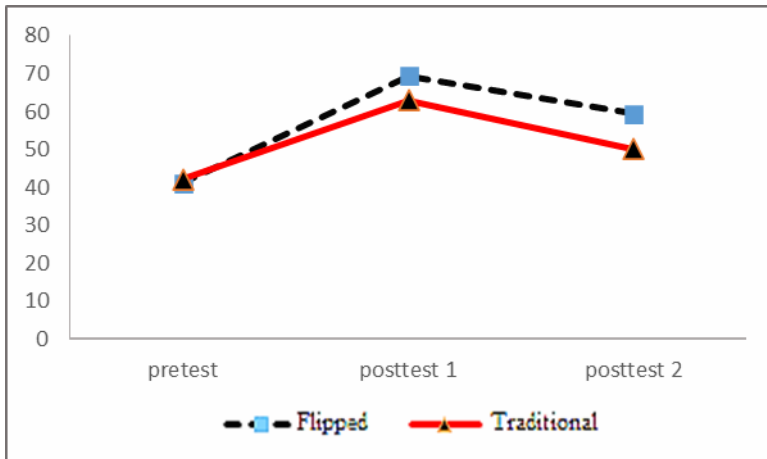*Explicit Knowledge Acquisition and Retention*

Figure 3

Implicit Knowledge Acquisition and Retention

Results showed a significant difference existed in explicit knowledge test scores across time for both flipped, $F(1.43, 48.03) = 288.14$, $p < .001$ and traditional groups, $F(2, 54) = 181.32$, $p < .001$. Also, two other repeated-measures one-way ANOVAs were carried out to investigate the implicit knowledge scores across the three test conditions for both groups. A significant difference was found in implicit knowledge test scores across time for both flipped, $F(1.67, 50.37) = 413.17$, $p < .001$ and traditional groups, $F(1.41, 38.21) = 141.32$, $p < .001$. Bonferroni *post hoc* tests showed significant differences in explicit knowledge scores between T1 - T2 ($p < $

.001), T1 - T3 (p < .001), and T2 - T3 (p < .001) for both flipped and traditional groups, where T1, T2, and T3 stand for the pretest, posttest, as well as delayed posttest, respectively. The second set of Bonferroni *post hoc* tests also demonstrated that there existed significant differences in implicit knowledge scores between T1 - T2 (p < .001), T1 - T3 (p < .001), and T2 - T3 (p < .001) for both flipped and traditional groups. Thus, the results indicate that both methods were effective in increasing the students' explicit and implicit knowledge.

Furthermore, to increase our understanding of the flipped class effect on knowledge retention, the ratio of the learners' delayed posttest scores over their immediate posttest scores was calculated for both implicit and explicit knowledge tests and the results were represented as percentage scores. Table 3 shows that the mean scores of students in the flipped class in both explicit as well as implicit knowledge retention tests are higher. The students in the flipped class retained 85% of their explicit grammar knowledge at the time of the delayed posttest, whereas those in the traditional group retained only 78%.

Regarding implicit knowledge retention, the numbers increased in both groups. While the learners in the flipped class succeeded in retaining 90% of their implicit grammar knowledge four weeks after the immediate posttest, their counterparts in the traditional class managed to preserve 80%. In general, the data indicate the superiority of the students of the flipped group in retaining both types of knowledge. Furthermore, implicit knowledge showed a higher retention rate compared to explicit knowledge in both classes.

Table 3

Proportion of Retained Explicit and Implicit Knowledge

Knowledge Type	Group	*n*	*M*	*SD*	*SEM*
Explicit Knowledge	Flipped	31	.85	.06	.011
	traditional	28	.78	.09	.017
Implicit Knowledge	Flipped	31	.90	.089	.016
	traditional	28	.80	.092	.017

Note. SEM= Standard Error of the Mean

Discussion

Findings revealed that explicit instruction in the flipped classroom was as effective as explicit instruction in the traditional class and effectiveness was not modulated by the teaching method although the bulk of the literature has reported the superiority of the flipped instruction in terms of improving student performance (e.g., Bezzazi, 2019; Bulut & Kocoglu, 2020; Fathi & Rahimi, 2020; Izadpanah & Afzali, 2021; Vaezi et al., 2019; Vitta & Al-Hoorie, 2020; Webb & Doman, 2016). What this study found is in agreement with the findings of a number of other studies in the language teaching field. Asaka et al. (2018), for example, found no significant difference between the students' grammar achievement in a flipped class and a traditional class. None of these studies, however, distinguish between different types of grammar knowledge.

There seem to be several possible explanations for the result obtained in the present study. First, the inconsistency found may pertain to different ways of executing the flipped class model. Although the general theoretical definitions of the concept presented in the literature appear to be broadly similar, it has been implemented in different ways in practice (e.g., McLaughlin, 2018). Second, as numerous studies (e.g. Lee & Wallace, 2018) have demonstrated flipped instruction probably needs time to reveal its beneficial effects. Therefore, it appears not to have a significant effect on students' learning in a short period. Iranian students who have been studying in traditional teacher-centered classes for more than 12 years by sitting quite passively and listening to the teachers' lecturers find it not easy to adapt to the flipped classroom, as a student-centered method, in just a few sessions or even a semester. Probably, they need more time to embrace it more wholeheartedly. Third, another probable reason closely related to the second explanation is the students' insufficient engagement with the components of the new method. Despite their initial enthusiasm for this new teaching method, which was largely due to its novelty, it gradually became apparent that most of them had lost their zest and were not sufficiently and actively engaged in pre-class and in-class activities.

Regarding knowledge retention, the findings showed a statistically significant difference in favor of the flipped class. The results seem to be partly in accord with Noroozi et al. (2020) that examined the flipped classroom effect on Iranian EFL learners' acquisition of English conditionals. They reported that the

experimental group who attended a flipped class outperformed the control group in the delayed posttests administered two weeks after instruction. Even though Shatto et al.'s (2017) study was conducted in the field of nursing and its retention intervals were different, the results of this study are somewhat in line with the findings of their research, too. In contrast, the present study finding regarding knowledge retention differs from Bouwmeester et al.'s (2019) that revealed retention of knowledge tests after ten months showed similar outcomes for students in a flipped class and those in a traditional class. Morton and Colbert-Getz (2016) also demonstrated that flipped classroom students' ability to retain knowledge was equal to that of their counterparts who had attended a traditional class. However, their study showed that students in the flipped class appeared to be more successful in applying knowledge in a test administered at the end of the course.

The current study finding on knowledge retention could be attributed to several possible reasons. First, the demonstrated superiority of the flipped class over the traditional class to retain both explicit and implicit knowledge possibly lies in incorporating principles of active learning which has been suggested to enhance knowledge retention (Cherney, 2008; Semb & Ellis, 1994). Semb and Ellis (1994), for example, confirmed that instructional "strategies that more actively involved students in the learning process" resulted in higher differential retention (p. 277). Craik and Lockhart's (1972) "levels of processing theory" may also account for the higher retention of knowledge in the flipped classroom. They claim the deeper the information processing is, the longer the memory trace lasts. Craik (1973) defines depth as, "the meaningfulness extracted from the stimulus rather than in terms of the number of analyses performed upon it." (p. 48). Various meaningful activities performed under the heading of active learning in the flipped class can result in deep information processing and hence enhance knowledge retention. The second possible reason could be repetition which has been confirmed by numerous studies as a contributing factor (e.g., Fukuta, 2016; Kang, 2016). A flipped classroom can provide learners with multiple opportunities in the form of various activities and assignments to repeat content before, during, and after the class, and thus can improve learning and help them to retain knowledge longer. Testing effect or test-enhanced learning could be the third possible reason for the longer retention of knowledge in the experimental group. Studies carried out on the testing effect has

demonstrated that administering tests during the learning process augments learning and knowledge retention, the benefits of testing are superior to restudying the material, and this is more evident on delayed posttests (e.g., Butler, 2010; Schwieren et al., 2017). In-class and out-of-class quizzes in the flipped class may bring about a positive effect on retaining students' grammar knowledge.

Furthermore, as the results indicated, implicit grammar knowledge showed a higher retention rate in both groups. This probably means that the forgetting rates of the two types of knowledge are different and implicit knowledge seems to be more resistant to loss. This possibility has also been raised by many other studies (e.g., Reber, 1989; Tunney, 2003). Reber (1989), for example, suggests "implicit systems are robust in the face of disorders that are known to produce serious deficits in conscious, overt processes" (p. 232). Some other studies have argued that the robustness of implicit learning is less affected by divided attention (e.g., Prull et al., 2016) and interference (Tamayo & Frensch, 2007; Tunney, 2003). Tamayo and Frensch (2007) draw upon the multiple memory systems theory to explain why interference might result in different rates of memory loss and forgetting for explicit and implicit knowledge. They argue that different memory systems that might be affected differently by interference support explicit and implicit knowledge.

Conclusion and Implications

The results of this study suggest that offering explicit grammar teaching in the flipped classroom was as effective as explicit grammar instruction provided during the traditional class, that flipped class had a more favorable effect on the learners' grammar knowledge retention, and the forgetting rates of explicit and implicit knowledge are not the same and the latter is less susceptible to loss. By providing empirical evidence for the advantages of flipped classroom model and explicit instruction, the findings can help and ensure educational policymakers, language program designers, and language teachers to capitalize on explicit instruction for teaching grammar in various educational settings including flipped classes in which a portion of the instruction is moved out of class with no decline in the learners' achievement. This study may also offer some insights into the potentials of using technology in education in general and the role of technology-enhanced instruction in foreign language development in particular. The findings

can also make a contribution to blended learning by showing how advantages inherent in this model can affect learners' language development. In addition, the results show that delegating part of the responsibility of learning to students and employing active learning strategies can lead to genuine educational achievements. In particular, it can initiate a gradual movement towards student-centered education in the Iranian higher education context mainly dominated by teacher-centered instruction. This study can also contribute to the debate about the effectiveness of explicit instruction, as a type of FFI, and its contribution to the language learners' explicit and implicit L2 grammar knowledge.

Several limitations, however, were imposed on the findings of the study. First, the long-term effect of explicit teaching was tested after a four-week interval; longer intervals may lead to different results. Thus, future studies can extend the interval and examine longer retention of L2 forms and structures. Second, all the students were at the intermediate level of English proficiency. Therefore, further similar studies could include participants with higher or lower L2 proficiency levels. Third, this study focused on tertiary education students; primary or secondary school students can be selected in future studies as research samples. Fourth, probably several participants already had some knowledge of target grammar points taught in this study. This could possibly affect the results. Hence, it is recommended that an artificial grammar be used in future studies. Fifth, research has shown that explicit instruction might have different effects on different L2 forms. The reported results in this study are based on scores obtained from tests which included items on English passive voice, conditionals, and articles. Different results might have been obtained if each of these three forms or structures had been chosen as the only target form in the study. Finally, given the broad definition of the flipped class in the literature, it is not surprising that the concept has been implemented differently in various studies. Differences in the ways the flipped class concept is implemented is a potential source of variation in research results. Therefore, authors should describe all characteristics and particularities of the implemented flipped classes in sufficient detail to allow other researchers to compare the results or replicate their studies. Consequently, the findings of the present study cannot be generalized to other contexts in which the flipped class model has been implemented differently.

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