FLIPPING IN A MICROLEARNING WAY:
EFFECTS ON EFL LEARNERS' ACHIEVEMENT AND MOTIVATION
IN A GRAMMAR COURSE

by **Hanieh Shafiee Rad**

Shahrekord University, Iran

haniyeshafieerad @ gmail.com

Abstract

This research employed microlearning and flipped teaching approach, both together and separately, to examine EFL learners' grammar achievement and motivation. The design of this study was quasi-experimental by employing three intact classrooms as experimental groups (i.e. microlearning, flipped learning, and microflipped learning) and one intact classroom as a control group (N = 25 for each group). The data was collected through pre-test and post-test that were administered to experimental and control groups, as well as motivated strategies for learning questionnaire (MSLQ) that was filled by the participants from experimental groups. The results showed that microlearning, flipped learning, and flipped learning approaches could help EFL learners to achieve significantly higher grammar skill. Besides, it was depicted that EFL learners revealed higher motivation in experimental groups for learning when compared with the control group. At the end of this study, the researchers provided recommendations on how to use flipped learning and microlearning methods, both together and separately. Findings suggest that the use of microlearning, flipped, and microflipped teaching/learning can be considered as an alternative model of teaching, as opposed to the traditional method, to motivate EFL students to better learning.

Keywords: Flipped Learning; grammar course; microlearning; microflipped learning

1. Introduction

The significance of EFL grammar teaching is endorsed by both teachers (Farshi, Tavakoli, & Ketabi, 2019; Myhill & Watson, 2013), and students (Graus & Coppen, 2016). For a long time, EFL teachers were interested in teaching grammar employing the traditional PPP (presentation, practice, production) approach (Carless, 2007). In these classes, teachers favor teaching grammatical rules directly and deductively (Andrews, 2003), and students consequently learn grammatical forms in a sequential order, and combine such grammatical knowledge with performing drill-like practicing and large amounts of activities in

workbooks. Nonetheless, one great problem with this prevalent method is that little consideration is spent on developing EFL students' grammatical ability (Richards & Reppen, 2014). Accordingly, L2 students generally find it hard to employ the grammatical knowledge which is learned in real-life conversation.

To migrate from this problem, the researcher is calling for reformation in L2 grammar teaching after the innovation of Communicative Language Teaching. There is growing agreement that instead of isolated grammatical rules (which are the locus of the traditional teacher-fronted grammar class), L2 students should be taught the meaning and application of grammatical structures in concrete contexts (Ellis, 2006). In a nutshell, L2 grammar classes should be communicative and improve L2 students' grammatical ability (Richards & Reppen, 2014) or "grammaring" (Larsen-Freeman, 2014). The utilization of Information and Communication Technologies has become popular in recent years (Myhill & Watson, 2013; Graus & Coppen, 2016), and investigations measuring the effects of technology-enhanced instruction on grammar learning have also grown in number (e.g., Liu et al., 2018). Two new methods of technology-enhanced learning are flipped and microlearning, but unfortunately the research on the effect of these two methods on the grammar skill of EFL learners is scarce. To reach this aim, form, meaning, and context should all be taken into account (Richards & Reppen, 2014). This study argues that the two methods that can be used to enhance active learning and improve EFL learners' grammar skill and motivation through communicative interaction are microlearning and flipped learning strategies, both when applied together and separately. These teaching methods are described in detail in the following sections.

2. Literature review

2.1. Microlearning

With the use of the Internet and the Web, theories and research often struggle to catch up with developments, interactions, and changes in technology and the social forms and practices evolving with it (Callow & Orlando, 2015). Concerning practical issues, lots of agreements have been made when introducing distributed education, networked learning, and distance learning (Lo & Hew, 2017). One of the new methods of technology-based and distance learning is microlearning. Microlearning is a technology-mediated learning approach through which students are directly exposed to short-term learning exercises formally or informally at their own pace (Khong & Kabilan, 2020). The research on microlearning is rare

in language learning and especially in the EFL field. In recent years, research by Khong and Kabilan (2020) introduced a theory of microlearning for L2 learners that is elaborated in the following part.

Three theories can be related to microlearning: Sweller's (2020) "Cognitive Load Theory" (CLT), Mayer's (2014a) "Cognitive Theory of Multimedia Learning" (CTML), and Ryan and Deci (2017) "Self-Determination Theory" (SDT) (Khong & Kabilan, 2020). Besides, promoting the typical alignment of cognitivist view on SLA (Atkinson, 2010) in contrast with behaviorism and constructivism can be another important issue. The suggested cognitive theories also explicitly support the conceptual characteristics of microlearning, for instance, CLT is most similar to the design and construction of microcontent and the manipulation of micro-activities, while CTML is closely associated with the use of mobile and digital micromedia (Khong & Kabilan, 2020). Furthermore, microlearning is associated with the student-centered approach because it supports the patterns of using media daily that support new generations' learning needs and preferences (Nikou & Economides, 2018). Looking back on definitional keywords of microlearning like personalized, adaptive, autonomous, and self-regulated learning it can be depicted that they highlight the significance of the motivational aspect of microlearning for L2 instruction (Khong & Kabilan, 2020). A theoretical model encompassing the dynamic interplay of cognitive and motivational theories within the concept of microlearning devised by Khong and Kabilan (2020) to offer a more principled way to integrate microlearning into L2 instruction across diverse languages and learning contexts as illustrated in Table 1.

Table 1. Theoretical and structural model of microlearning for L2 instruction by Khong and Kabilan (2020)

Effective Microlearning	Cognitive Psychology Domain	CTML	Dual-Channel	Technical Aspect
			Active Processing	Technical Aspect
			Limited Capacity	Technical Aspect and Instructional Design Aspect
		CLT	Intrinsic CL	Instructional Design Aspect
			Extraneous CL	Instructional Design Aspect
			Germane CL	Instructional Design Aspect
	Motivational Psychology Design	SDT	Autonomy	Learner Motivational Aspect
			Competence	Learner Motivational Aspect
			Relatedness	Learner Motivational Aspect

In this model, CTML concentrates on creating a micromedia using different technology affordances that mainly adheres to the multimedia policy, while CLT focuses on creating the architecture of digital microcontent, and SDT is purposefully optimized to decrease the element interactivity, therefore, lower the overall complexity of learning material for a given L2 learning purpose (Khong & Kabilan, 2020). These correlations among CTML, CLT, and SDT are compatible with Bikowski and Casal's (2018) framework for learning with digital resources that presents the inter-relationship among learners (who), content (what), and technology (how). Besides establishing the interrelationships within cognitive and motivational theories, this CTML-CLT-SDT model justifies the practicality of microlearning as a successful learning approach in previous research in diverse domains (Liu, Sands-Meyer, & Audran, 2018; Webb & Doman, 2019).

2.2. Flipped learning

One of the technology-enhanced learning approaches is flipped learning (Shafiee Rad, 2021). Flipped learning can be described as the process of transferring information that would be presented during the traditional in-class time to out-of-school time; it can also be defined as a learning process carried out by students in the home context as if they were in the classroom (Bergmann & Sams, 2012; Jensen et al., 2015). In other words, in the flipped classroom the use of classroom and extracurricular time exchanges, exercises, such as homework, are done in the classroom; that is, an activity that was traditionally done in the classroom is done outside the classroom (Abeysekera & Dawson, 2015; Hao, 2016). Flipped learning also provides a more pleasant environment (Abeysekera & Dawson, 2015; 2017; Chang & Hwang, 2018; Enfield, 2013; Hwang et al., 2019; Sergis et al., 2018; Zainuddin, 2018), which leverages learner-centered activities (Foldnes, 2016) and natural group work (Ferreri & O'Connor, 2013). This method can take advantage of instructional technologies to put passive content in use outside of the classroom. Flipped learning allows the core content to be studied before face-to-face class time (Lo & Hew, 2017). As Talbert (2014) states, this method can be with and without technology use. The flipped classroom without technology use was first used in the schooling schemes of Socrates, law schools, and composition classes where learners read core content before attending the class. Subsequently, it was used by Mazur (1997) in his physics' class (Talbert, 2014). The technology-based type of flipped learning was introduced by Bergman and Sams (2012), where they received help from the emails and videos to deliver the content of the physics' class to their students.

It can be said that flipped learning has found support from the theories of constructivism, Bloom's (1978) taxonomy of learning, and Vygotsky's theory of the Zone of Proximal Development (Shafiee Rad et al., 2021). Constructivists (e.g., Piaget, 1968) assert that the use of interactive actions in which learners play active roles can involve and motivate learning more efficiently than activities where learners are passive. Bloom (1978) also highlights the necessity to focus on higher-level learning goals, not simply on basic skill. He puts great importance on problem-solving, analytical skill, and creativity which can be used in the flipped classroom. The flipped learning approach also finds support from Vygotsky's theory of the Zone of Proximal Development. Vygotsky (1978) assumes that when a learner is at the zone of proximal development for a particular task, affording the appropriate assistance will help the learner achieve the task.

The flipped teaching method and research investigating its effectiveness have mostly been based on university students in different fields (Akçayır & Akçayır, 2018). Meta-analysis research on language learning carried out on the flipped learning/teaching method shows positive effects of the method on language learning outcomes, in general, compared with traditional methods (Cheng, Ritzhaupt, & Antonenko, 2019). Some studies indicate that flipped teaching/learning have positive effects on L2 educational outcomes and variables, such as academic achievement and self-efficacy (Lai & Hwang, 2016; Ye, Chang, & Lai, 2019), motivation (Chang & Hwang, 2018; Hwang et al., 2019), project performance, critical thinking, and group self-efficacy (Chang & Hwang, 2018). When examined conceptually, flipped teaching/learning method can affect the L2 grammar skill (Liu et al., 2018; Shafiee Rad, 2021), but is rarely examined in the EFL context.

2.3. Microflipped learning

This study aims to integrate flipped and microlearning to introduce a stronger model of teaching. This model of teaching aims to take the lecture outside the classroom as it is one of the key features of a flipped classroom (Lai & Hwang, 2016; Ye, Chang, & Lai, 2019). Also, the traditional homework activities can be replaced by the lecture time as it is an advantage of flipped learning (Chang & Hwang, 2018). Besides, microflipped learning takes into account the length of the video to consider the cognitive psychology domain of teaching/learning (Erbil & Kocabaş, 2018; Hattie, 2009; Johnson et al., 2000; Kyndt et al., 2013) and includes controls to ensure that participants have seen the video so as to obtain the same functionality that students have in a lecture and motivate them to have active learning (Khong & Kabilan, 2020). This includes opportunities to ask the teacher questions, to have a dialogue between

the classmates and the teacher, and to be recommended additional material that helps them to take into account the motivational psychology design subthemes (Khong & Kabilan, 2020). In other words, the combination of microlearning and flipped learning prepares students to learn in a technology-based context and enhances their skill by activating their motivation, cognition, active learning, and interaction.

2.4. Purpose of the study

One of the aims of this research is to uncover how the flipped classroom and microlearning methods affect students' motivation levels. Khong and Kabilan, (2020) proposed a model for investigating the effect of microlearning on academic achievement in an L2 context. By using this model as a reference, this study examines how the microlearning method affects student grammar achievement. Furthermore, the flipped classroom method is considered as a new method that lacks sufficient research into its impact on EFL grammar. Also, most research done on the flipped classroom was conducted with university students (Liu et al., 2018). This study will contribute to the literature in examining the effects of flipped learning and microlearning methods used both together and separately in the EFL context and in comparing the effectiveness levels between the groups. Thus, the objectives of the research can be summed up by the following research questions:

1.   Does the implementation of micro, flipped, and microflipped learning have any significant effect on the achievement of EFL students' grammar skill?
2.   Does the implementation of micro, flipped, and microflipped learning have any significant effect on the motivation of EFL students' in learning grammar skill?

3. Method

3.1. Design of the study

This study used the pretest-posttest design for the control group from the experimental method and semi-trial models (Cohen et al., 2011). Semi-experimental models are a kind of study in which the data is observed under the supervision of the researcher in order to discover cause and effect relationships (Karasar, 2009). The reason behind using this model as part of this research is that it is not possible to impartially assign students to different groups (Kerlinger & Lee, 1999).

3.2. Setting and participants

This study was undertaken in two English language institutes in Iran. The research was conducted with the participation of 100 intermediate male EFL students (N for each class = 25) who attended general English classes twice a week for 90 minutes each session. All participants were native speakers of Persian and were from 19 to 24 years old (M = 18.5, SD = 2.1). The student's proficiency level was determined based on the Oxford Placement Test (OPT) taken by the institute before registration. All of the students had 1-3 years (M = 25 months) of experience since they formally began learning English. The participants were in four intact classes which were randomly selected and assigned to the microlearning, flipped, microflipped, and control groups. They studied with *Oxford Living Grammar Intermediate* (Coe, 2010) as their coursebook, which is a generally taught coursebook in the country. Students in the research were volunteers and written informed consent from learners and institutes authorities was obtained. Their course included instructions sections on learning grammar. The teacher of the four classes was the same non-native English teacher (female, age = 26).

3.3. Experimentation

To investigate the effectiveness of microlearning, flipped, and microflipped approaches on enhancing L2 grammar skill, three experimental groups and one control group were assigned. They were: Group 1 (microlearning), Group 2 (flipped learning), Group 3 (microflipped learning), and Group 4 (traditional lecture-based learning). The treatments were given for 11 weeks (see Table 2). The same teacher and the same coursebook were used with the four groups. In the experimental groups, the same mobile software (Edmodo App) was used as a technology-enhanced tool. Additionally, care was taken to ensure the time allocated for teacher lecturing was the same in four groups. The following parts elaborate on the procedure of the control and experimental groups.

Table 2. General scheme of teaching grammar in four groups

Weak	Focus
1	Administering pretest motivated strategies for learning questionnaire (MSLQ)
2	Administering pretest
3	Elaborating on verbs and tenses
4	Elaborating on modal verbs

5	Elaborating on verb forms and structures
6	Elaborating on noun, pronoun, determiners
7	Elaborating on adjectives and adverbs
8	Elaborating on propositions
9	Elaborating on building sentences
10	Administering posttest motivated strategies for learning questionnaire (MSLQ)
11	Administering posttest

3.3.1. Control group

In the control group, the traditional lecture-based deductive teaching was employed and participants met twice a week for a total of one-and-a-half hours. The teacher utilized the traditional lecture format, disseminating teaching through the use of multiple sliding whiteboards and an overhead video projector. The lecture classroom was designed to seat about 26 students. The students in this group normally sat passively at their seats and listened to their teacher, taking notes in the class. They rarely engaged in dialogue with the teacher. At home, they did their homework on paper and pencil (such as completing the coursebook exercises).

3.3.2. Microlearning group

Instruction administered in the microlearning group was based on the theoretical and structural model of microlearning for L2 instruction by Khong and Kabilan (2020). Using the Edmodo App, a group channel was created by the teacher, and the students were added to the class. Every lesson of the course was divided into smaller parts (e.g., elaborating on verbs and tenses were divided into five parts namely 1) Present Simple and Present Continuous; 2) talking about the past; 3) Present Perfect; 4) Past Simple and Present Perfect; and 5) the future), and 10-min videos were created by the teacher on each of these topics (Cognitive Psychology Domain). The students did not have to attend the physical classroom (Motivational Psychology Design). Every day of the week, one of these ten-minute videos was uploaded by the teacher to the Edmodo app. The students had to watch the videos and then answered the quiz in the App (Cognitive Psychology Domain). In order to engage students in learning and make them motivated the teacher asked them to use the grammar rule, they had learned in a real-life context and record it, then share it with the classmates (Motivational Psychology Design). After that, the teacher checked the recorded videos of the students and looked at the answers of the students to the quiz, and gave them feedback through the Edmodo App. The videos were available for them to watch whenever they want.

The students had to do homework (such as doing the exercises in the book) and share them with the teacher through a technology-enhanced App.

3.3.3. Flipped learning group

The teacher in this approach also created a channel group of the class in the Edmodo app. The students also had to join the Edmodo and then enter a code to join the class. A day before attending a physical classroom, the teacher uploaded a video of her lectures on the topic of the course (e.g., elaborating on verbs and tenses). The length of the video was about one and a half hours/an hour and a half. The students had to watch the video and answer a quiz in the App by cooperating with their classmates. The logic behind the quiz in this approach was that the students had watched the video and then were encouraged to work collaboratively. In the physical class, the time was spent on doing exercises and solving the problems. There was not any homework after a class for the students to complete at home.

3.3.4. Microflipped learning group

The purpose of this model is usually to deliver the lecture outside the classroom. Microflipped learning takes into consideration the length of the video and adds controls to ensure that students had seen the video. This involves possibilities to ask the teacher questions, to have a dialogue between the students and the teacher, and for the teacher to recommend additional material. The idea here was not to cover the entire lecture, but only the most important parts of it and to begin employing concepts. The video used in the model was about ten minutes long. In this study, the teacher created a single flipped learning video session, empowering the student to focus on the most significant part of the lecture. For these purposes, it was the teacher themselves who had to record the video and share them with the students in the Edmodo app. Each video has an associated obligatory quiz that students had to answer in an Edmodo App. In this way, it was established that participants had seen the video and learned the most important parts. The students were equipped with additional material that was extended, supplemented, or reflected upon what is displayed in the video. The teacher might provide such material or it may be presented as an external resource. The students had to do the tasks individually at their own pace after watching the videos. Accordingly, in this activity students have generated learning resources, which had three purposes: (1) to check the degree of assimilation of the concepts in exercises outside the classroom; (2) to generate instructional resources for use in classroom activities; and (3) to get students to be actively engaged in the learning process. In a physical classroom, the

objective was that the learners interact, participate and cooperate. The teacher used the results of the students' works they shared with her to trigger a discussion with other students (for example, a student with various results shares his/her opinion setting a discussion to see which results were more valid). The usual format for this activity was a brief lecture begun by the students and fulfilled by the teacher in the right format (see Table 3 to overview the procedures in control and experimental groups).

Table 3. The procedure of four groups of the study

Group	Material delivery	Teaching Method			
		Before class	In class		After class
			Online Session	Face-to-face Session	
Control Group (Teacher fronted classroom)	Learning materials were in print format and were delivered during in-class activities to the students.	None	None	30-minute lecture of the teacher 30-minute reading of examples in the textbook and elaborating on them 30-min writing activities and checking them by the teacher	Composing a piece of argumentative writing and submitting it over the following week
Experimental Group (Microlearning)	The learning materials were made available in the electronic format via the Edmodo App and students can use them whenever they wish.	None	Watching 10-min videos every day on every topic Do the quiz on the App Receive feedback on the quiz	None	Creating a 5-min video and sharing with the teacher and friends what they understand from the topic Doing homework and delivering it to the teacher through App.
Experimental Group (Flipped Learning)	Learning materials were in the print format and were delivered during in-class activities and before physical class, the materials were available on the Edmodo App.	Watching the video uploaded by the teacher and completing the quiz in the App.	None	30-minute solving the homework and at-home activity through cooperative learning 30-minute reading of examples in the textbook and elaborating on them 30-minute tutorial and/or strategy training	None

| Experimental Group (Microflipped learning) | Out-of-class learning materials were made available before class in the electronic format via the Edmodo App as a supplement, while worksheets associated with in-class activities were provided in written format. | Watching a 10-min video that was uploaded by the teacher. Interacting with the teacher and ask about their problems. Doing the quiz in the App. Receiving additional material and study them. Doing an individual exercise and delivering it to the teacher via App | None | 30-minute task analysis of the students delivered online to the teacher 10-minute micro lecture of the teacher 20-minutes problem solving 20-minutes of cooperative working with classmates. | None |

3.4. Instrumentation

3.4.1. Motivated strategies for learning questionnaire (MSLQ)

One of the tools used in this study was the motivated strategies for learning scale, which is known as the "Motivated Strategies for Learning Questionnaire" (MSLQ, Pintrich et al., 1993), rather than forming a new one. This scale has viewed motivation from a socio-cognitive perspective. According to this concept, students are active processors of education. Cognition and opinions are affected by the characteristics of the task and educational inputs (Duncan & McKeachie, 2005). The scale is based on three basic motivational constructs, which are expectancy, value, and affect. Pintrich et al. (1993) describe the first concept of expectancy, which is the opinion of students regarding success. The value describes how students are committed to an academic task or subject, and the effect is relevant to the anxiety and worries students experience during exams. The expectation part of the scale consists of two subscales: self-efficacy for learning and production and control of learning beliefs. The value sub-dimension consists of three subscales: intrinsic goal orientations (concentrate on learning and mastery), extrinsic goal orientations (supported by grades and others), and task value (how interesting, helpful, and important the course content is for the student). The

affect component consists only of the test anxiety subscale. In this research, only the motivation component was involved in the implementation process, and the original factor that was produced for the scale for undergraduate students was adhered to. To ensure reliability, Cronbach's Alpha was calculated and internal consistency coefficient was found to be 0.71 for the intrinsic goal orientation (4 items), 0.75 for extrinsic goal orientation (4 items), 0.77 for task value (6 items), 0.69 for control of learning beliefs (4 items), 0.82 for self-efficacy for learning and performance (8 items), 0.81 for test anxiety (5 items), and 0.91 for the whole scale.

3.4.2. Grammar task

To obtain the data for analysis, two parallel researcher-made grammar knowledge tests were outlined and developed by a board of well-experienced EFL instructors. The board members, who were two EFL instructors, were selected based on their experience in teaching the English language and familiarity with the learners' coursebook. The tests included the grammatical constructions involved in each lesson of the learners' textbook. The textbook's lessons covered a range of grammatical structures such as passive and active voice, direct and indirect speech, two-word verbs, be going to, Present Perfect tense, relative clauses, and gerund structures. Each of the tests contained 20 multiple-choice items and 20 grammaticality judgment items containing all grammar points of the learners' coursebook to assess the grammatical knowledge of the learners before and after the experiment. The reliability was calculated as (Item = 40, α = .95). The allotted time was 60 minutes and the correct answer to each item received one point. There was no penalty for false responses. At the end of the treatment, a post-test was administered to the participants of the research. The post-test was the second stage of the mixed test of the book whereas the pretest was the first stage. The validity of the post-test was also checked by the teachers who validated the pre-test and its reliability was computed as (Item = 40, α = .89).

3.5. Data collection and analysis

After and before the experiment, the researchers asked the participants to complete MSLQ on motivation. The paired sample t-test was used to compare the scores of MSLQ in the pre-and post-test. Additionally, the participants completed the pre-and post-test in order to compare the achievements of participants in different groups. The pre-and post-test scores were analyzed through the one-way between-groups analysis of variance (ANOVA) and Scheffe post-hoc test to reveal the difference. Regarding the MSLQ, paired-samples comparisons for

pre-test and post-test scores were computed to see whether the groups have improved in terms of motivation and motivation subskills.

4. Results

4.1. Research Question 1

Descriptive statistics and relevant statistical tests were carried out to address the first research question. Table 4 shows the descriptive statistics of writing scores in control, microlearning, flipped learning, and microflipped groups. As displayed in Table 4, the learners' writing mean scores in the microlearning group increased largely from the pretest ($M = 26.81$) to the posttest ($M = 35.69$). Besides, in the flipped group the mean scores increased from the pretest ($M = 26.58$) to the posttest ($M = 36.65$), and the microflipped group the pretest ($M = 26.65$) to the posttest ($M = 37.31$), whereas the learners' mean scores in the control group increased slightly from the pretest ($M = 27.88$) to the posttest ($M = 30.42$). Based on the descriptive results, the learners in the microlearning, flipped, and microflipped group performed better on the grammar posttest than the learners in the traditional group. Also, it seemed that the learners in the microflipped group had performed better than the microlearning and flipped group.

Table 4. Descriptive statistics of grammar skill scores in four groups

Variable	Groups	N	Min	Max	*M*	*SD*	Skewness	Kurtosis
Pre-test	Control	25	24	31	27.88	15.06	-.204	-.618
	Microlearning	25	21	30	26.81	13.30	-.399	-.914
	Flipped	25	22	27	26.58	23.67	-.383	-.794
	Microflipped	25	21	28	26.65	13.60	-.442	.456
Post-test	Control	25	28	39	30.42	14.71	-.164	-.812
	Microlearning	25	32	47	35.69	7.94	-.63	-1.303
	Flipped	25	31	49	36.65	7.53	-.278	-1.133
	Microflipped	25	33	50	37.31	7.50	-.261	.456

The examination of the descriptive statistics assured that the skewness and kurtosis values of the argumentative writing scores were well within a range of ±1.5 showing fairly acceptable normality of variances. However, because the samples were small, the normality and homogeneity test, that is, the Shapiro-Wilk and Levene's tests for homogeneity of variances

were used. The results of the Shapiro-Wilk test demonstrated that the grammar scores were normally distributed both in the pre-test [D (26) = .954, p = .305, D (26) = .942, p = 301, D (26) = .940, p = .240 and D (26) = .938, p = .136] and in the post-test [D (26) = .964, p = .500, D (26) = .953, p = .432, D (26) = .937, p = .463, and D (26) = .934, p = .291] for the control, microlearning, flipped, and microflipped groups, respectively. Moreover, the Levene's test for homogeneity of variances demonstrated no significant difference in the variances between four groups (F = .05, p = .985), which supported the use of a parametric test for further data analysis.

A one-way between-groups analysis of variance (ANOVA) was conducted on the grammar scores in the pre-test phase in the four groups of the study. In effect, as Table 5 shows, the performance of the four groups was not significantly different in the pre-test ($p <$ 0.05).

Table 5. One-Way ANOVA on Pretest Grammar Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	29.038	3	9.679	.050	.985
Within Groups	19398.923	97	193.989		
Total	19427.962	100			

Another one-way between-groups ANOVA was conducted to see whether the implementation of the microlearning, flipped, and microflipped learning had any significant effect on the performance of EFL learners' grammar skill in comparison with the traditional instruction. The independent variable was the type of instruction/class (traditional vs. microlearning, flipped, and microflipped learning) named as Group in the analysis.

Table 6. ANOVA for treatment effects on posttest grammar score

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected model	10218.6[a]	3	3406.21	34.68	.000	.51
Intercept	649380.03	1	649380.03	6611.95	.000	.98
Group	10218.65	3	3406.21	34.68	.000	.51
Error	9821.30	97	98.21			
Total	669420	100				
Corrective total	20039.96	99				

[a] R^2 Squared = .510 (Adjusted R^2= .495)

The ANOVA results revealed a statistically significant main effect for Group, *F* (3, 97) 34.68, *p* < .05, partial eta squared =.51, which means that there were significant differences among the post-test writing mean scores of the four groups receiving different types of instruction. A partial eta squared value of .51 represented quite a large effect size, indicating that 51% of the variance in the grammar post-test means could be explained by the type of instruction. To investigate the differences between the groups on the posttest, the Scheffe post-hoc test was conducted (see Table 7).

Table 7. Multiple comparisons on the posttest writing score in the Scheffe Post-hoc test

Groups	Groups	Mean Difference (I-J)	Std. Error	*Sig.*	95% Confidence Interval	
					Lower Bound	Upper Bound
Microflipped	Control	6.89(*)	2.749	.000	-34.09	-18.45
Microlearning	Control	5.27(*)	2.749	.000	-28.05	-12.41
Flipped	Control	6.23(*)	2.749	.000	-27.70	-12.07
Microflipped	Microlearning	2.37	2.749	.192	-1.78	13.85
Microflipped	Flipped	1.33	2.749	.152	-1.43	14.20
Microlearning	Flipped	1.04	2.749	.999	-7.47	8.16

* The mean difference is significant at the .05 level.

As Table 7 indicates, microflipped, microlearning, and flipped groups scored significantly higher than the control group (*p* = .000) regarding the EFL learners' grammar skill performance. However, there was no significant difference between microflipped, microlearning, and flipped groups when compared with each other (*p* >.05).

4.2. Research Question 2

To examine whether the pre-and post-training motivation levels of students in the microlearning, flipped, and microflipped differed significantly, the participants answered the questionnaire items. First, the descriptive statistics were calculated to check for the normality of the data. As displayed from the data, learners' mean scores in the microlearning group increased largely from the pre-test (*M* = 2.50, 2.35, 1.98, 2.23, 3.35, 2.76) to the post-test *(M* = 3.69, 3.42, 3.24, 4.01, 3.86, 3.47). Besides, in the flipped group the mean scores increased from the pre-test (*M* = 2.58, 2.34, 2.87, 2.36, 2.34, 2.65) to the posttest (*M* = 3.65, 3.78, 4.21, 3,93, 3.46, 4.45), and the microflipped group the pre-test (*M* = 2.65, 2.45, 2.76, 2.67, 2,89, 2.83) to the posttest (*M* = 3.31, 3.76, 3.89, 3.76, 3,78, 3.67), whereas the learners' mean scores in the control group increased slightly from the pre-test questionnaire (*M* = 2.88, 2.23,

2.34, 2.54, 2.45, 2.65) to the post-test (*M* = 2.77, 2.12, 2.14, 2.31, 2.23, 2.17). Besides, the skewness and kurtosis were between ±1 for all four groups, which shows a normal range. Based on the descriptive results, the learners in the microlearning, flipped, and microflipped group had better motivation based on the post-test questionnaire than the learners in the traditional group. Further analysis was conducted to see the differences.

Paired samples comparisons for pre-test and post-test scores were computed to see whether the experimental groups had improved in terms of motivation (intrinsic goal orientation, extrinsic goal orientation, task value, and control of learning beliefs, self-efficacy for learning and performance, and test anxiety). The results of paired samples *t*-test indicated that microlearning, flipped, and microflipped conditions increased motivation and subskills of motivation questionnaire respondents, that is the people that filled in the questionnaires over time (Table 8).

Table 8. The results of paired samples t-test

| | | **Paired Differences** | | | | | | | **Sig. (2-tailed)** |
| | | | | | 95% Confidence Interval of the Difference | | | | |
Group	**Variable**	**Mean**	*SD*	**Std. Error Mean**	**lower**	**upper**	**t**	*df*	
Microlearning	Intrinsic goal orientation	-2.88	1.13	.22	-3.34	-2.41	-12.74	24	.000
	Extrinsic goal orientation	-2.96	1.02	.20	-3.38	-2.53	-14.51	24	.000
	Task value	-3.16	.98	.19	-3.56	-2.75	-16.01	24	.000
	Control of learning beliefs	-3.20	1.08	.21	-3.64	-2.75	-14.81	24	.000
	Self-efficacy for learning and performance	-3.64	1.03	.20	-4.06	-3.21	-17.56	24	.000
	Test anxiety	-3.28	1.06	.21	-3.71	-2.84	-15.45	24	.000
Flipped	Intrinsic goal orientation	-3.44	1.12	.22	-3.90	-2.97	-15.34	24	.000
	Extrinsic goal orientation	-3.20	.86	.17	-3.55	-2.84	-18.47	24	.000
	Task value	-3.12	.92	.18	-3.50	-2.73	-16.82	24	.000
	Control of learning beliefs	-3.20	.81	.16	-3.53	-2.86	-19.59	24	.000
	Self-efficacy for learning and performance	-3.20	1.00	.20	-3.61	-2.78	-16.00	24	.000
	Test anxiety	-3.52	1.04	.20	-3.95	-3.08	-16.83	24	.000
Microflipped	Intrinsic goal orientation	-3.44	1.08	.21	-3.88	-2.99	-15.87	24	.000
	Extrinsic goal orientation	-3.56	.91	.18	-3.93	-3.18	-19.42	24	.000
	Task value	-3.40	1.11	.22	-3.86	-2.93	-15.20	24	.000
	Control of learning beliefs	-3.40	1.04	.20	-3.83	-2.97	-16.33	24	.000
	Self-efficacy for learning	-3.28	1.02	.20	-3.70	-2.85	-16.05	24	.000

and performance								
Test anxiety	-3.24	1.05	.21	-3.67	-2.80	-15.39	24	.000

5. Discussion

In this study, it has been found that the microlearning method, the microlearning method in the flipped learning environment, the flipped learning method, and the teaching activities in the grammar curriculum have a significant effect on the academic achievement level of students. The group with the highest score and the highest effect size in the academic achievement test average was the group in which the microlearning method was applied in the flipped learning environment, and this result was statistically significant when compared with the other experimental groups.

The results of this study showed the flipped learning method positively affected the achievement level of students in the EFL grammar course compared with conventional teaching methods. One of the reasons may be the students' interest in using technology in the teaching method because nowadays technology is a necessary tool in people's lives. Another reason possibly is changing homework and lecture time. This is because in flipped learning instruction the students can watch a lecture at home, learn the skill, and in a classroom can apply what they learn and solve their grammar learning problem. Those results are consistent with the findings of the effects of flipped learning on academic achievement in the L2 context (e.g., Liu, Sands-Meyer, & Audran, 2018; Webb & Doman, 2019). On the other hand, the results showed that the microlearning instruction improved the grammar skill of EFL students more than traditional lecture-based teaching. The reason may be the application of technological tools, the limited time of learning (only 10 minutes every day), and the availability of the lecture whenever needed. These results confirmed the Khong and Kabilan's (2020) theoretical model of microlearning which demonstrated significant benefits for EFL/L2 students. Furthermore, Nikou and Economides (2018) confirmed the effectiveness of microlearning on high school students' achievement. Moreover, the results showed that the microlearning method when used in combination with the flipped learning method has a positive impact on the academic achievement of students in the grammar course. The reason possibly is the use of technology and active learning in both methods. In addition, cooperative learning in microflipped learning may be another reason for the student's improvement. Numerous studies in various areas on cooperative learning support this finding (Erbil & Kocabaş, 2018; Hattie, 2009; Johnson et al., 2000; Kyndt et al., 2013).

Therefore, one conclusion is that using two methods together will provide important benefits to students (Lai & Hwang, 2016).

Comparisons between experimental groups were made in terms of motivation levels based on subcomponents. According to the findings of the analysis; the microlearning alone, the microlearning method used alongside the flipped environment, and the flipped learning method used alone all positively and significantly affected the motivation levels of students as per the grammar course curriculum. When the flipped learning method is applied both by itself and alongside the microlearning method, it improves the students' intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy for learning and performance, and test anxiety beliefs in the sub-dimensions of motivation. The reason may be the application of the environment of flipped and microlearning which helped the students to learn in the self-space (through video), facilitated their question generation through the app without worrying about the limited time of the class and allowing them to repeat the lecture whenever they need to learn it completely. This result is consistent with the findings of other studies in the literature on the effect of the flipped classroom on motivation (Abeysekera & Dawson, 2015; 2017; Sergis et al., 2018; Zainuddin, 2018; Chang & Hwang, 2018; Hwang et al., 2019).

6. Conclusion, implication and limitation

In summary, the findings of this study revealed that using a microlearning, flipped learning, and microflipped learning strategy can significantly improve skills of using grammar by students in the EFL classroom compared with the traditional lecture-based teaching. The analysis of data, also, revealed using these methods improved the motivation of the EFL students.

This study has some implications for language teachers and researchers. First, the findings of the study show that the way language teachers present classroom activities could have a differential effect on engaging students in learning. Therefore, it is suggested that teachers be careful about how they plan and sequence their classroom strategies. For researchers, in the future, more practical pedagogical approaches both for out-class and in-class activities can be implemented in the microlearning, flipped learning, and microlearning process in other parts of EFL, such as writing, reading, and oral comprehension, and it will also be possible to develop new digital tools or utilize other existing instruments to accelerate active learning in students' learning.

This study has some limitations. First, this study is limited by the participants' gender. This study was conducted only with male participants. It is suggested that similar studies should be done with male and female participants before any generalization is made about the findings. Second, this study is limited to quasi-experimental research (using intact groups). Further research can apply true experimental research by applying systematic sampling.

References

Abeysekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: Definition, rationale and a call for research. *Higher Education Research & Development, 34*(1), 1-14. https://doi.org/10.1080/07294360.2014.934336

Akçayır, G., & Akçayır, M. (2018). The flipped classroom: A review of its advantages and challenges. *Computers & Education, 126*, 334-345. http://dx.doi.org/10.1016/j.compedu.2018.07.021

Andrews, S. (2003). Just like instant noodles: L2 teachers and their beliefs about grammar pedagogy. *Teachers and Teaching, 9*, 351-375. https://doi.org/10.1080/1354060032000097253

Atkinson, D. (2010). Extended, embodied cognition and second language acquisition. *Applied Linguistics, 31*(5), 599-622. https://doi.org/10.1093/applin/amq009

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day.* International Society for Technology in Education.

Bikowski, D., & Casal, J. E. (2018). Interactive digital textbooks and engagement: A learning strategies framework. *Language Learning & Technology, 22*(1), 119-136. https://doi.org/10125/44584.

Bloom, B. S. (1978). *Taxonomy of educational objectives: The classification of educational goals.* Longman.

Boo, Z., Dörnyei, Z., & Ryan, S. (2015). L2 motivation research 2005–2014: Understanding a publication surge and a changing landscape. *System, 55*, 145-157. https://doi.org/10.1016/j.system.2015.10.006

Callow, J., & Orlando, J. (2015). Enabling exemplary teaching: a framework of student engagement for students from low socio-economic backgrounds with implications for technology and literacy practices. *Pedagogies: An International Journal, 10*(4), 349-371. http://dx.doi.org/10.1080/1554480X.2015.1066678

Carless, D. (2007). The suitability of task-based approaches for secondary schools: Perspectives from Hong Kong. *System, 35*, 595-608. http://dx.doi.org/10.1016/j.system.2007.09.003

Chang, S. C., & Hwang, G. J. (2018). Impacts of an augmented reality-based flipped learning guiding approach on students' scientific project performance and perceptions. *Computers & Education, 125*, 226-239. http://dx.doi.org/10.1016/j.compedu.2018.06.007

Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2019). Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis. *Educational Technology Research and Development, 67*, 793-824. https://doi.org/10.1007/s11423018-9633-7

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education* (7th ed.). Routledge.

Coe, N. (2010). *Oxford living grammar: Intermediate.* Oxford University Press.

Dörnyei, Z. (2009). The L2 Motivational Self System. In Z. Dörnyei & E. Ushioda (Eds.), *Motivation, language identity and the L2 self* (pp. 9-42). Multilingual Matters.

Ellis, R. (2006). Current issues in the teaching of grammar: An SLA perspective. *TESOL Quarterly, 40*, 83-107. http://dx.doi.org/10.2307/40264512

Enfield, J. (2013). Looking at the impact of the flipped classroom model of instruction on undergraduate multimedia students at CSUN. *TechTrends, 57*(6), 14-27. https://doi.org/10.1007/s11528-013-0698-1

Erbil, D. G., & Kocabaş, A. (2018). Cooperative learning as a democratic learning method. *Journal of Research in Childhood Education, 32*(1), 81-93. https://doi.org/10.1080/02568543.2017.1385548

Farshi, N., Tavakoli, M., & Ketabi, S. (2019). Receiving different types of input for learning and retention of English grammatical collocations in EFL classrooms. *Pedagogies: An International Journal,* 1-16. https://doi.org/10.1080/1554480X.2019.1671848

Ferreri, S. P., & O'Connor, S. K. (2013). Redesign of a large lecture course into a small-group learning course. *American Journal of Pharmaceutical Education*, *77*(1), 13-31. https://doi.org/10.5688/ajpe77113

Foldnes, N. (2016). The flipped classroom and cooperative learning: Evidence from a randomized experiment. *Active Learning in Higher Education, 17*(1), 39-49. https://doi.org/10.1177/1469787415616726

Gardner, R. C. (2010). *Motivation and second language acquisition*. Peter Lang Publishing Inc.

Golonka, E. M., Bowles, A. R., Frank, V. M., Richardson, D. L., & Freynik, S. (2014). Technologies for foreign language learning: A review of technology types and their effectiveness. *Computer Assisted Language Learning, 27*(1), 70-105. https://doi.org/10.1080/09588221.2012.700315

Graus, J., & Coppen, P.-A. (2016). Student teacher beliefs on grammar instruction. *Language Teaching Research, 20*(5), 571-599. https://doi.org/10.1177/1362168815603237

Hao, Y. (2016). Exploring undergraduates' perspectives and flipped learning readiness in their flipped classrooms. *Computers in Human Behavior, 59*, 82-92. https://doi.org/10.1016/j.chb.2016.01.032

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

Hwang, G. J., Chen, M. R. A., Sung, H. Y., & Lin, M. H. (2019). Effects of integrating a concept mapping-based summarization strategy into flipped learning on students' reading performances and perceptions in Chinese courses. *British Journal of Educational Technology, 50*(5), 2703-2719. https://doi.org/10.1111/bjet.12708

Jensen, J. L., Kummer, T. A., & Godoy, P. D. D. M. (2015). Improvements from a flipped classroom may simply be the fruits of active learning. *CBE-Life Sciences Education, 14*(1), 1-14. http://dx.doi.org/10.1187/cbe.14-08-0129

Johnson, D. W., Johnson, R. T., & Stanne, M. E. (2000). *Cooperative learning methods: A meta-analysis*. University of Minnesota Press.

Karasar, N. (2009). *Bilimsel araştırma yöntemleri [Scientific research methods]*. Nobel.

Kerlinger, F. N., & Lee, H. B. (1999). *Foundations of behavioral research* (4th ed.). Hancourt College Publishers.

Khong, K. H., & Kabilan, M. K. (2020). A theoretical model of micro-learning for second language instruction. *Computer Assisted Language Learning*, 1-31. http://dx.doi.org/10.1080/09588221.2020.1818786

Kyndt, E., Raes, E., Lismont, B., Timmers, F., Cascallar, E., & Dochy, F. (2013). A metaanalysis of the effects of face-to-face cooperative learning. Do recent studies falsify or verify earlier findings? *Educational Research Review, 10*, 133-149. http://dx.doi.org/10.1016/j.edurev.2013.02.002

Lai, C. L., & Hwang, G. J. (2016). A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course. *Computers & Education, 100*, 126–140. https://doi.org/10.1016/j.compedu.2016.05.006

Larsen-Freeman, D. (2014). Teaching grammar. In M. Celce-Murcia, D. Brinton, & M. A. Snow (Eds.), *Teaching English as a second or foreign language* (4th ed., pp. 256–270). National Geographic Learning.

Liu, C., Sands-Meyer, S., & Audran, J. (2018). The effectiveness of the student response system (SRS) in English grammar learning in a flipped English as a foreign language (EFL) class, *Interactive Learning Environments*, 1-23. https://doi.org/10.1080/10494820.2018.1528283

Lo, C. K., & Hew, K. F. (2017). A critical review of flipped classroom challenges in K-12 education: Possible solutions and recommendations for future research. *Research and Practice in Technology Enhanced Learning, 12*(1), 4-21. https://doi.org/10.1186/s41039-016-0044-2

Macaro, E., Handley, Z., & Walter, C. (2012). A systematic review of CALL in English as a second language: Focus on primary and secondary education. *Language Teaching, 45*(01), 1-43. https://doi.org/10.1017/S0261444811000395

Martin, A. J. (2016). *The motivation and engagement workbook* (16th ed.). Lifelong Achievement Group.

Mayer, R. E. (2014a). Cognitive theory of multimedia learning. In R. E. Mayer (Ed.), The *Cambridge handbook of multimedia learning* (2nd ed., pp. 43–71). Cambridge University Press. https://doi.org/10.1017/CBO9781139547369.005

Mazur, E. (1997). *Peer instruction: A user's manual series in educational innovation*. Prentice Hall.

Meriel, B., Thomas, S., Ronald, T., Elizabeth, K., & Hazel, D. (1972). *Objective Tests in English as a Foreign Language*. Macmillan Education.

Myhill, D., & Watson, A. (2013). The role of grammar in the writing curriculum: A review of the literature. *Child Language Teaching and Therapy, 30*(1), 41-62. https://doi.org/10.1177/0265659013514070

Nikou, S. A., & Economides, A. A. (2018). Mobile-based micro-learning and assessment: Impact on learning performance and motivation of high school students. *Journal of Computer Assisted Learning, 34*(3), 269-278. https://doi.org/10.1111/jcal.12240

Piaget, J. (1968). *On the development of memory and identity* (2nd ed.). Clark University Press.

Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53*(3), 801‑813. https://doi.org/10.1177/0013164493053003024

Richards, J. C., & Reppen, R. (2014). Towards a pedagogy of grammar instruction. *RELC Journal, 45*, 5-25. http://dx.doi.org/10.1177/0033688214522622

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford Press.

Sergis, S., Sampson, D. G., & Pelliccione, L. (2018). Investigating the impact of Flipped Classroom on students' learning experiences: A Self-Determination Theory approach. *Computers in Human Behavior, 78*, 368-378. https://doi.org/10.1016/j.chb.2017.08.011

Shafiee Rad, H. (2021). Effect of PCaRD DGB flipped learning on EFL learners' grammar skill. *Journal of Asia TEFL, 18*(2), 544-558. https://doi.org/10.18823/asiatefl.2021.18.2.10.544

Shafiee Rad, H., Roohani, A., & Rahimi Domakani, M. (2021). Flipping EFL learners' writing classroom through role-reversal and discussion-oriented models. *Language Learning & Technology, 25*(2), 158-177. http://hdl.handle.net/10125/73438

Sweller, J. (2020). Cognitive load theory and educational technology. *Educational Technology Research and Development, 68*(1), 1-16. https://doi.org/10.1007/s11423-019-09701-3

Talbert, R. (2014). Inverting the linear algebra classroom. *PRIMUS, 24*(5), 361-374. https://doi.org/10.1080/10511970.2014.883457

Thai, N. T. T., De Wever, B., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best "blend" of lectures and guiding questions with feedback. *Computers & Education, 107*, 113-126. http://dx.doi.org/10.1016/j.compedu.2017.01.003

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Webb, M., & Doman, E. (2019). Impacts of flipped classrooms on learner attitudes towards technology-enhanced language learning, *Computer Assisted Language Learning,* 1-35 http://dx.doi.org/10.1080/09588221.2018.1557692

Ye, X. D., Chang, Y. H., & Lai, C. L. (2019). An interactive problem-posing guiding approach to bridging and facilitating pre-and in-class learning for flipped classrooms. *Interactive Learning Environments, 27*(8), 1075-1092. https://doi.org/10.1080/10494820.2018.1495651

Zainuddin, Z. (2018). Students' learning performance and perceived motivation in gamified flipped-class instruction. *Computers & Education, 126*, 75-88. https://doi.org/10.1016/j.compedu.2018.07.003