



To flip or not to flip: Potential effects on EFL reading comprehension*

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Abstract

This study examines the potential effect of the flipped instruction on the reading comprehension skills (viz., scanning, paraphrasing, and giving opinion) of EFL tenth-grade students from the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) schools in South Amman, Jordan. The study uses a quasi-experimental, pre-/post-test design to gauge the potential effect of a ten-week treatment in the first semester of the academic year 2018/2019. The findings suggest that the students taught through flipped instruction outperformed those who were instructed per the guidelines of the teacher book both in the subskills of scanning, paraphrasing, and giving opinion and in overall reading comprehension. Several pedagogical implications and recommendations are put forth.

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1. Introduction

Reading is essentially an interactive process of understanding the meaning of a text (Cobb, 2007), and a "complex conjoining of "word" and "world", "text" and "context" (Green, 1997, p.231). It is shaped by the interplay among the text, the reader's background, and the context (Hunt, 2004), as it does not involve only finding information in the text itself but also working with it to reconstruct meaning. According to Maleki and Heerman (1992, p.2),

[r]ather than seeing the teaching of reading as one in which a student labors towards mastering a long list of reading skills, content instructors should view

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reading as a process where readers conduct transactions with writers as they read textbooks.

Reading becomes even more essential in foreign language learning, as its role doubles to involve learning and supporting other communication processes (viz., listening, speaking, and writing) (Bataineh, Bataineh, & Thabet, 2011; Bataineh, Thabet, & Bataineh, 2007; Hittleman, 1988).

Reading comprehension is the evolution of one's thought as he/she reads, which underlies the processing efficiency, language knowledge, strategic awareness, extensive reading practice, working memory resources (viz., critical reflection), and purpose for reading (Grabe, 2004). This is further corroborated by longitudinal research which establishes the relationship of reading comprehension to vocabulary and working memory (Seigneuric & Ehrlich, 2005), to prior word recognition skills, vocabulary knowledge, and grammatical awareness (Muter, Hulme, Snowling, & Stevenson, 2004), and to syntactic awareness and processing (Al-Damiree & Bataineh, 2016; Nation, Clarke, Marshall, & Durand, 2004; Stothard & Hulme, 1992).

Reading Research (e.g. Hannon & Daneman, 2006; Oakhill, Berenhaus, & Cain, 2015; Perfetti & Hart, 2001; Shiotsu, 2010; Palincsar & Brown, 1984) further suggests that comprehension involves several skills: lower-level lexical skills (e.g., word reading efficiency, vocabulary knowledge), sentence-level skills (e.g., knowledge of grammatical structure), and higher-level text processing skills (e.g., inference generation, comprehension monitoring, working memory capacity). Whereas higher-level skills (e.g., skimming, scanning, prediction, inferring, gaining the meaning from the figurative language, making connection and drawing conclusion) enable the reader to make the necessary integrative and inferential links to construct a meaning-based representation of the text and, consequently, comprehend it (Al-Damiree & Bataineh, 2016; Moreillon, 2007), efficient lower-level lexical skills (e.g., word recognition, vocabulary knowledge, syntactic analysis) facilitate comprehension by availing higher-level processing with more resources.

Technology has become an integral part of educational practice, but there seems to still be challenges pertaining to creating conducive learning environments to suit the requirements of the digital age. In third-world educational contexts, the major challenge is more a result of inadequately equipped learning environments than the dearth of knowledge or inclination to use new pedagogical models and strategies. Technology and technological innovations are much valued, and often coveted, by teachers and students alike (e.g. Baniabdelrahman, Bataineh, & Bataineh, 2007; Bataineh & Mayyas, 2017; Bataineh, Bani Khalaf, & Baniabdelrahman, 2018; Fisher, Higgins, & Loveless, 2006;

Harris, Mishra, & Koehler, 2009; Mayyas & Bataineh, 2019), but schools continue to be under-equipped that teachers seek alternatives for better teaching and learning.

Of the promising models of technology integration in education is flipped classroom, also known as flipped learning, flipped instruction, inverted classroom, flipped classroom model, flipping the classroom, inverting the classroom, or, simply, flipping or the flip. The model commenced with Baker's presentation of video-based lessons at the eleventh International Conference on College Teaching and Learning (Baker, 2000; Creative Classroom Lab, 2013) and later used and popularized by Chemistry teachers Bergmann and Sams (Bergmann & Sams, 2012; Johnson, 2012).

Flipped classroom is essentially an instructional model which combines video-based learning outside the classroom and interactive group learning activities inside it. Learning is sought to happen outside the classroom (Adnan, 2017; Karabulut-Ilgü, Jaramillo Cherez, & Jähren, 2018) in which learners only engage in hands-on practice under the teachers' supervision (Chen Hsieh, Wu, & Marek, 2017). In other words, a flipped classroom swaps instruction and homework, as new information is presented to learners, mostly through video, outside the boundaries of the classroom for them to later engage in interactive, learner-centered classroom activities (Chuang, Weng, & Chen, 2018). This *a priori* provision of the content to the learners potentially enables them to pace their learning through pausing, rewinding, and replaying the videos as needed (Chen Hsieh, Wu, & Marek, 2017).

Flipped instruction is based upon pillars which range in number between *four* (viz., *FLIP: flexible environment, learning culture, intentional content, and professional educators* (Flipped Learning Network, 2014)) and *seven* (viz., *FLIPPED: flexible environment, student-centered learning culture, intentional content, professional educators, progressive networking learning activities, engaging and effective learning activities, and diversified and seamless learning platforms* (Chen, Wang, Kinshuk, & Chen, 2014)). Both the original and expanded sets of pillars address the active learning space in- and outside the classroom which must remain flexible enough for teachers to create small group work stations, individual work areas, and venues to speak to students individually; the shift from teacher-centered into learner-centered classroom, where the teacher is no longer the 'sage on the stage' but rather a facilitator who circulates to check student work, provide feedback, and engage in brief periods of one-to-one instruction; the teacher's decision as to what and how content need be presented through videos; and the professional teacher who is capable of designing instruction, creating learning outcomes, and providing expert student guidance.

Following an increased interest in examining the utility of flipped classroom in foreign language teaching (e.g., Çetin Koroğlu & Çakır, 2017), more in higher than in general education, flipped instruction is reported to potentially improve academic achievement

(e.g., Alsowat, 2016), foster cognitive skills (e.g., Kong, 2014), increase learner engagement (e.g., Chen Hsieh, Wu, & Marek, 2017), and decrease learner cognitive load (e.g., Turan & Goktas, 2016).

In addition to the inherent use of technology in the latter, there are marked differences between the traditional and flipped classrooms. The traditional classroom is one where the teacher is foremost and center, as he/she determines and deliver content to learners who are essentially recipients of this content and uniform performers of the same activities put forth by the teacher. This practice is often supplemented by homework assignments meant to support learning and foster retention. By contrast, the teacher of a flipped classroom provides self-prepared or selected materials (e.g., short videos, video/audio presentations, slideshows, animations, and screencast content) in advance for independent learning out of the classroom at each learner's own time and pace.

The direct instruction traditionally delivered in the classroom is assigned as homework (e.g., video, reading tasks) whereas the follow-up practice traditionally assigned as homework is done in the classroom. Hence, as learners work with the content, not only does each learn but he/she also identifies potentially difficult topics or areas which need more attention either with the teacher's help or on his/her own.

Educational scholars and practitioners alike are divided on the merit of flipped classroom. Some consider flipping the future standard of educational technique while others consider it a passing trend which will be found an ineffective and undesirable form of education (Bergmann, Overmyer, & Wilie, 2013). Some research (e.g. Gundlach, Richards, Nelson, & Levesque-Bristol, 2015) reported that students in the traditional classroom preform significantly better than those in a flipped one.

However, an extensive body of research suggests that flipped classroom leads not only to better ownership and active learning (Gallagher, 2009; Laman, Brannon, & Mena, 2012; Overmyer, 2012), better understanding and achievement (Gannod, Burge, & Helmick, 2008; Kellogg, 2009; Minhas, Ghosh, & Swanzy, 2012), increased engagement (Goodwin & Miller, 2013; Schullery, Reck, & Schullery, 2011; Toto & Nguyen, 2009), and more efficient use of class time (Boucher, Robertson, Wainner, & Sanders, 2013; Cole & Kritzer, 2009; Tucker, 2012) but also to more opportunities for individualized attention (Enfield, 2013; Lage, Platt, & Treglia, 2000), and the luxury for teachers to use and reuse online course materials once and again (Wang & Zhu, 2019).

Flipped classroom has three manifestations: *traditional flipped classroom* which entails swapping class- and home-work to do the former at home and the latter in the classroom (Bergmann & Sams, 2012; 2014), *partially flipped classroom* which is less strict than the first model (Bajunury, 2014) and entails allowing learners to watch videos outside the

classroom as enrichment activities (Springen, 2013), and *holistic flipped classroom* which combines the physical and mobile environments to enable students to p/review lectures, attend synchronous class sessions, discuss course content with teacher and with fellow students, and carry out hands-on activities (e.g., upload reports, take online quizzes) (Chen *et al.*, 2014; Ozdamli & Asiksoy, 2016).

This research uses the *holistic flipped classroom* through combining face-to-face instruction with online instruction via the Edmodo platform which is a social networking-like website for educational purposes. Edmodo was used to establish the online learning community needed to facilitate flipped instruction and create an environment for the participants to share ideas, files, and assignments through mobile access and messaging. Edmodo has been reported to facilitate assessment (through its quiz builder or poll feature), role play, peer reviews and critiques, writing projects, digital citizenship skills, language practice (through Edmodo conversations), book clubs, cultural exchange projects, sub-hub (communicating with and providing updates to students outside the classroom), backchannel discussions (learning extension beyond the classroom), science probes, mobile learning, planning committees (for future collaboration), gamification, project based learning (through leveraging Edmodo's small-group feature), differentiated instruction (through small groups and shared folders), professional learning, school clubs, alumni groups, and professional development workshops for teachers (Edmodo, 2016).

Empirical research suggests that flipped instruction is advantageous for EFL learners' proficiency and achievement not only in reading comprehension (Chen Hsieh, Wu, & Marek, 2016; Huang & Hong, 2015) but across various school subjects (Enfield, 2013; Johnson, 2012; Nawi, et al., 2015). More relevant to this research, flipped instruction through a learning management system (e.g., Edmodo, Moodle) has been reported to contribute significantly to students' achievement and attitudes towards learning in various disciplines (Guo, 2017; Mori, Omori, & Sato, 2016; Wu, Hsieh, & Yang, 2017).

However, despite generally positive reports of the effect of flipped instruction on teaching and learning, little research points out the potential demerits of flipped instruction. The novelty of any teaching model may pose initial implementational challenges despite the teacher's enthusiasm and good intentions (Collins, 2011), especially if the learners are not ready or inclined to do the extra video work outside the classroom (Raths, 2013), which also doubles the amount of teacher time as he/she works not only to teach in class but also to design or select appealing video resources and facilitate student learning outside the classroom (Bergmann & Sams, 2014).

Although reading has been found to catalyze learning in both the language classroom and those of other content areas, which has drawn attention to its significance and brought about several reforms in curricula and training alike, EFL student performance in reading

comprehension, in the United Nations Relief and Works Agency for Palestine Refugees in the Near East (henceforth, UNRWA) and Jordanian public schools alike, still leaves a lot to be desired. Research out of Jordan reports that students still find it difficult to comprehend texts, (e.g., Al-Jamal, Al-Hawamleh, & Al-Jamal, 2013; Baniabdelrahman *et al.*, 2007; Bataineh *et al.*, 2018; Bataineh & Mayyas, 2017; Mayyas & Bataineh, 2019), which is affecting their success in both public and tertiary education.

This research examines the potential effect of flipped classroom instruction on EFL tenth-grade students' reading comprehension skills (*viz.*, scanning, paraphrasing, and giving opinion). More specifically, it seeks an answer to the question, *are there statistically significant differences in the experimental and control groups' overall reading comprehension and in the skills of scanning, paraphrasing, and giving opinion, which can be attributed to instruction (flipped vs. traditional instruction)?*

The findings of this study may be significant due to the relative novelty of the topic in both UNRWA and the Jordanian EFL context. The research seeks to contribute to the existing body of research on flipped instruction in Jordan which, to the best of these researchers' knowledge, has been limited to examining the effect of flipped learning on primary-stage pupils in science (Elian & Hamaidi, 2018), private university students' perceptions of the utility of flipped learning (Aljaraideh, 2019), and teachers' perceptions of the effect of flipped learning on student learning and teacher role in Jordanian Schools (Abuhmaid, 2020).

2. Method

2.1. Sampling and Instrumentation

The participants of the study were all 67 tenth-grade students conveniently selected from an all-girl UNRWA school in Amman, Jordan. They were divided into two groups: an experimental group of 38 students, taught through flipped instruction, and a control group of 33 students, taught per the guidelines of the prescribed tenth-grade Teacher's Book.

A pre-/post-test was designed to gauge the potential effects of the treatment on the participants' reading comprehension. The validity of the test was established by an expert jury of seven EFL university professors whose recommendations were reflected on the final version of the test. The reliability of the test was also established by administering it twice to a pilot of 10 students, excluded from the sample of the study, with a three-week interval.

The reliability coefficient between the two administrations amounted to 0.88, which was deemed appropriate for the purpose of the research.

2.2. Instructing the Groups

In conducting the research, the two groups were taught the content of the prescribed textbook (*Action Pack 10*) itself, but whereas the control group was taught by the original teacher per the guidelines of the prescribed Teacher's Book, the experimental group was taught through flipped instruction by the second researcher who also observed a total of three 45-minute class sessions to ensure that the control group was indeed instructed per the guidelines of the Teacher's Book. Following is a detailed account of the ten-week instructional treatment of the two groups:

2.2.1 The Experimental Group

The treatment was implemented in three stages whose procedures were as follows:

Before Class: Preparation

The participants of the experimental group were taught to create an account, log into, and use the Edmodo platform. One day before class, the participants accessed the Edmodo platform to download the videos, movie maker, and hyperlinks to the reading texts. The instructor/ second researcher demonstrated how to use them and provided the participants with a YouTube video demonstration for further clarification. After individual work on the videos and texts, the participants shared their experience with their classmates through writing what they learned after which they did the online quiz and received immediate feedback. The instructor/ second researcher monitored the participants' work, helped them reflect on their progress, and provided them with further feedback.

In Class: Active Learning

Class time involved various interactive tasks per the assigned reading texts and skills covered in the previous stage. The session commenced with a warm-up phase in which the instructor/ second researcher revised the assigned skills and text, provided further clarification of the content, and asked questions to ascertain that the students had indeed studied the assigned materials before class.

The students then engaged in various in-class pair and/or group activities and exchanged open-ended questions about their respective interpretation of the texts under the supervision of the teacher who encouraged deeper comprehension and raised their awareness of how to express their opinions and think more critically about the reading

texts. At this point, the participants practiced interpretation and search techniques through the *Think Box* activity.

After Class: Reflection

The reflection phase comprised independent practice of the reading comprehension skills (and related vocabulary), as set by the learners themselves. The participants did independent reading activities and kept records of their activities in the *Progress Corner* or the files shared through Edmodo.

2.2.2 The Control Group

The control group was taught per the guidelines of the prescribed *Action Pack Teacher's Book*. The reading activities were presented directly to students to do in pairs or groups as the teacher explained how to best answer them.

The reading activities in Action Pack 10 are classified into types according to the presented skill (viz., listen and read, read and answer comprehension questions, read and complete the Table below the text, read and match sentences related to the text, check the meaning of words you do not know, and correct the given text with suitable words from the provided box). Scanning questions are addressed in four types (viz., deciding whether sentences are true or false, answering comprehension questions, correcting the order of events, and checking number referents in the passage). The teacher usually explains that the best way to answer scanning questions is by identifying the keywords in the question and finding them in the text. The teacher generally has students work on the questions in pairs or groups to provide answers aloud to the class after which the teacher writes the best answers on the board. Opinion questions are taught through class discussion, as the teacher asks students to read and answer the question then write the best answers on the board. Paraphrasing questions are taught deductively, as individual students read through the text to find and underline relevant information to copy into a Table in their notebooks and later discuss their answers in pairs or groups. The teacher writes the correct answers on the board and discusses them with the whole class.

3. Results

The question of the research sought to identify potential statistically significant differences (at $\alpha=0.05$) between the experimental and control group students' overall reading comprehension and that of *scanning*, *paraphrasing*, and *giving opinion*, which can be

attributed to instruction. A reading comprehension pre/post-test was administered, and the students' mean scores and standard deviations were calculated, as shown in Table 1.

Table: 1

Means and standard deviations of students' reading comprehension scores on the pre- and post-test

Skill	Group	Pre-		Post-		Adjusted Mean	SE
		Mean	SD	Mean	SD		
Scanning	Experimental	8.68	2.056	10.32	2.156	10.280	.313
	Control	8.36	2.434	9.06	2.030	9.105	.317
Giving Opinion	Experimental	2.74	1.399	5.56	2.149	5.611	.290
	Control	2.97	1.960	2.94	1.936	2.886	.294
Paraphrasing	Experimental	4.65	1.983	7.97	2.928	7.948	.393
	Control	4.85	2.266	4.48	2.063	4.509	.399
Overall Reading Comprehension	Experimental	16.06	3.805	23.85	6.657	23.894	.834
	Control	16.18	5.394	16.48	4.711	16.442	.847

n

Experimental =34, n Control =33, All = 67

Table 1 shows observed differences between the mean scores of the two groups on *scanning*, *giving opinion*, *paraphrasing*, and *overall reading comprehension* on the pre- and post-test. To determine whether these differences are statistically significant (at $\alpha=0.05$), Multivariate Analysis of Covariance (MANCOVA) was used, as shown in Table 2.

Table: 2

MANCOVA of students' scores on the reading comprehension scores on the post-test

Skill	Source (Post-)	Sum of Squares	df	Mean Squares	f	Sig.	Partial Eta Squared
Scanning	Dependent Variable	54.367	1	54.367	16.463	*.000	.210
	Scanning	6.002	1	6.002	2.116	.151	.033
	Giving Opinion	36.290	1	36.290	6.975	*.010	.101
Giving Opinion	Paraphrasing	4.131	1	4.131	1.251	.268	.020
	Scanning	48.212	1	48.212	16.995	*.000	.215
	Giving Opinion	.229	1	0.229	0.044	.835	.001

Skill	Source (Post-)	Sum of Squares	df	Mean Squares	f	Sig.	Partial Eta Squared
Paraphrasing	Paraphrasing	54.367	1	54.367	16.463	*.000	.210
	Scanning	48.212	1	48.212	16.995	*.000	.215
	Giving Opinion	24.732	1	24.732	4.754	.033	.071
Group	Paraphrasing	22.812	1	22.812	6.908	*.011	.100
	Scanning	122.605	1	122.605	43.220	*.000	.411
	Giving Opinion	195.245	1	195.245	37.527	*.000	.377
Error	Paraphrasing	204.750	62	3.302			
	Scanning	175.878	62	2.837			
	Giving Opinion	322.570	62	5.203			
Corrected Total Reading Comprehension	Paraphrasing	312.030	66				
	Scanning	387.164	66				
	Giving Opinion	622.687	66				

* Statistically significant at ($\alpha = 0.05$)

Table 2 shows statistically significant differences (at $\alpha=0.05$) in the students' post-test scores in *scanning*, *giving opinion*, *paraphrasing*, and *overall reading comprehension* in favor of the experimental group ($f=6.908$; $df=1$; $P=0.011, 0.000, 0.000$).

To determine whether or not there are statistically significant differences in the participants' overall reading comprehension scores, which can be attributed to instruction, One-Way Analysis of Covariance (ANCOVA) was used, as shown in Table 3.

Table: 3

ANCOVA of participants' scores on overall reading comprehension on the post-test

Source	Sum of Squares	df	Mean Square	f	Sig.	Eta Squared
Pre-Test	658.799	1	658.799	27.854	.000	.303
Group	929.842	1	929.842	39.314	*.000	.381
Error	1513.708	64	23.652			
Corrected Total	3081.642	66				

* Statistically significant at ($\alpha = 0.05$)

Table 3 shows statistically significant differences in the participants' overall reading comprehension, which may be attributed to instruction.

4. Discussion

Statistically significant differences were detected in the participants' *scanning, giving opinion, paraphrasing* and *overall reading comprehension* in favor of the flipped instruction group. This improvement may be readily attributed to the features of flipped instruction (*viz., collaboration, culture shift, flexible environments* and *intentional content*) which not only catalyzed the interaction between teacher and learners but also shifted the teaching/learning process from one which is teacher-centered to another which is deliberately collaborative and learner-centered.

The improvement in the participants' *scanning, giving opinion, paraphrasing*, and *overall reading comprehension* may be readily attributed not only to the use of videos and other resources but also to the explicit activities in which they engaged in and out of the classroom over the course of the treatment. These activities provided hands-on practice as the participants collaborated to learn in a self-paced, non-threatening environment.

Flipped instruction, grounded in constructivism and active learning, helped the participants construct learning, by using inductive learning strategies and critical analysis of key concepts each at her own pace, through the use of PowerPoint slides, audio scripts, YouTube videos, hyperlinks and worksheets via the Edmodo platform. The participants were able to chat each week before class, which facilitated collaboration for reading comprehension practice. The quizzes, 'ask and answer' posts, tasks, and learning logs also catalyzed learning and provided the participants with feedback to foster learning.

Through Edmodo, the participants read about the skill and used the knowledge they gained to answer questions on each reading text, which was further supplemented with their access to extra-practice hyperlinks, comprehension quizzes with immediate-feedback, and self-assessment tests. The immediate feedback and self-pacing capabilities of flipped instruction not only reduced learning time but also contributed to increased confidence, better attitudes, and a sense of accomplishment towards learning.

Throughout the treatment, the participants engaged in reflective practice as they worked on their *scanning, paraphrasing*, and *giving opinion* skills. They engaged not only in self-reflection but also in peer-reflection, as they reflected on their own and on other

participants' work to identify points of strength and weakness and address the latter through collaborative work.

The amalgamation of various resources and modalities of learning, through a set of rich in- and out- of class differentiated tasks to cater for the participants' diverse abilities, may have catalyzed the effect of the treatment. The participants manifested better understanding and a marked improvement in reading comprehension on every skill and overall. These findings are consistent with those of previous research (e.g., Abaeian & Samadi, 2016; Al-Harbi & Alshumaimeri, 2016; Bataineh & Mayyas, 2017; Chen Hsieh *et al.*, 2016; Huang & Hong, 2015; Mayyas & Bataineh, 2019), which reported positive effects of online learning on reading comprehension.

The participants' *scanning*, *paraphrasing*, and *giving opinion* and *overall reading comprehension* were significantly improved by the treatment, but more so for *giving opinion* than for *scanning* and *paraphrasing* despite a relatively marked weakness in *giving opinion* (vs. *scanning* and *paraphrasing*) which persisted for the control group despite the treatment. This may be readily attributed to the complexity of expressing one's opinion. In *scanning* and *paraphrasing*, learners *find* and *restate* information from the text itself whereas in *giving opinion* they have to *reflect* on this information and *verbalize* this reflection without the luxury of the scaffold provided to *scanning* and *paraphrasing* by the text itself.

5. Conclusions

The findings have given rise to several conclusions. The treatment has brought about improvement in the participants' reading comprehension skills, which may suggest a positive relationship between flipped instruction and the improvement in the skills under study. The reversal of classroom and home activities may readily turn the latter into a hub for ownership and active learning. Flipped instruction has the potential to foster proper interaction between teacher and learner, capitalize on agency and learner-centeredness, offer individual and collaborative spaces for learning, and free teachers from their traditional roles as authoritative sources of knowledge to become catalysts and co-creators of more conducive learning.

Several pedagogical implications may be gleaned from the findings. Flipped instruction may constitute an alternative or supplementary approach to traditional teaching and learning, which may allow for the provision of opportunities for meaningful engagement which may, in turn, catalyze ownership, autonomous learning, and literacy development and, hence, contribute to better learning of language and other subject matters to which

reading is key. The novelty of flipped instruction, along with the explicit instruction and authentic texts, may also add to both the effectiveness of and the pleasure in learning.

The study is limited by few considerations: the participants were UNRWA tenth-grade female students whose needs and performance may differ from those of male students or those in other grade levels and types of school. Moreover, the treatment lasted for ten weeks in the first semester of the academic year 2018/2019, but a longer interim may have augmented the generalizability of the findings.

The findings have given rise to recommendations for teachers, textbook writers, and researchers. EFL teachers are urged to engage in skill-based instruction. Similarly, textbook writers and curriculum designers are called upon to address the advantages of incorporating less conventional modes of instruction. Researchers are also recommended to expand the findings of this research through examining the potential effectiveness of flipped instruction on other language skills. Future research may also involve larger samples over an extended interim to improve the generalizability of the findings and examine how human factors, such as intelligences and cognitive style, interact with flipping.

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