ENHANCING EFL LEARNER AUTONOMY THROUGH FLIPPED INSTRUCTION: EFFECTS ON PSYCHOLOGICAL, TECHNICAL, SOCIAL, AND CRITICAL-POLITICAL DIMENSIONS

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Abstract: Despite the fact that existing research has strengthened our understanding of the potential of the flipped classroom (FC) for foreign language development and the advantages it offers for active learning, relatively little research has been conducted on the effect of the flipped model on learner autonomy. This study explored the effects and influencing factors of a flipped model on learner autonomy among English-as-a-foreign language (EFL) learners. The results indicate that students in the flipped group (n = 48) had significantly greater learner autonomy than did their counterparts in the non-flipped group (n = 37) in terms of psychological, technical, social, and cultural-political dimensions. The factor analysis suggests that perceived learner autonomy was highly correlated with environmental factors and individual factors, while a moderate correlation existed between factors related to tasks and learner autonomy. Stepwise regression analyses reveal that environmental factors had the most significant and positive effect on learner autonomy, among which learning resources and teacher response were identified as the most influential variables. These findings confirm that FC is an effective approach for enhancing learner autonomy, with environmental factors playing a crucial role in fostering independent learning.

Keywords: EFL learning, factor analysis flipped classroom, instructional design, learner autonomy

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In the era of artificial intelligence (AI), learner autonomy (LA) has gained heightened significance owing to dramatic and ever-changing technology. AI-driven educational technologies, such as adaptive learning platforms and intelligent tutoring systems, provide learners with personalized feedback, self-paced learning opportunities, and automated assessments, fostering self-regulation and independence (Jiang et al., 2022; Tsai, 2021). Individuals with a high level of LA are better equipped to adapt to the changes created by AI since automation and machine learning are transforming industries to a degree beyond imagination. They possess the ability to proactively acquire new skills, stay current with emerging technologies and efficiently discover complex information. Furthermore, LA reinforces creativity, critical thinking, and problem solving—qualities that are essential for lifelong learning—when the traditional boundaries between the classroom and everyday life

become increasingly vague because abundant new tools and options are available for learners both inside and outside the classroom.

Over the past four decades, there has been a growing trend of research on LA in the context of foreign language (FL) education (Dang, 2010; Dang, 2012; Hamad, 2018, Turan & Akdag-Cimen, 2020). Various perspectives and educational practices have been proposed to enhance LA. Among the many teaching approaches integrated with technology, the Flipped Classroom (FC) has become a trend among instructors and has therefore received considerable attention from many researchers (Jiang, et al., 2022; Tang, et al., 2020; Tecedor & Perez, 2019; Turan & Akdag-Cimen, 2020; Zainuddin, & Perera, 2019). Xiao et al. (2018) asserted that FC is one of the most promising models for facilitating students' AL. This approach, supported by educational technology, enhances student engagement, promotes active learning, and fosters autonomy by encouraging learners to take responsibility for their own learning process (Hung, 2015; Lin & Hwang, 2018).

Despite the fact that previous research has extended our understanding of the potential of FC for foreign language development and its affordances for active learning, relatively few studies have investigated its impact on LA. Most prior research has focused on the effects of FC on language proficiency, motivation, and academic performance (Turan & Akdag-Cimen, 2020), with limited attention paid to how it affects various dimensions of autonomy, including psychological, sociocultural, and critical-political perspectives (Dang, 2012; Hamad, 2018). This disparity underscores the need for more research on how FC fosters LA beyond cognitive and technical aspects.

The implementation of FC in linguistics courses is particularly pertinent because linguistics involves complex theoretical concepts and analytical skills that benefit from active and student-centered learning. Traditional lecture-based approaches often result in passive knowledge absorption, whereas FC allows students to engage more deeply with linguistic theories, data analysis, and problem-solving tasks through interactive classroom activities. Furthermore, linguistics as a discipline emphasizes critical thinking and pattern recognition, which align well with the autonomous learning principles promoted by FC. By shifting foundational content delivery outside of class, FC provides students with the opportunity to review key linguistic concepts at their own pace and apply them in classroom discussions, collaborative exercises, and practical linguistic data analysis.

Given the increasing reliance on technology-enhanced learning environments, it is crucial to examine how flipped instruction can facilitate LA in English as a foreign language (EFL) contexts. Researchers have pointed out the significance of investigating both instructional and contextual factors influencing LA (Benson & Voller, 2014; Dang, 2012). Carroll et al. (2021) proposed a model identifying three key categories of factors affecting LA: individual factors (e.g., motivation, cognitive ability, self-efficacy), task-related factors (e.g., challenge, meaningfulness, feedback), and environmental factors (e.g., learning resources, teacher support, psychological safety). Understanding the interplay between these factors and FC implementation can provide deeper insights into optimizing pedagogical strategies for fostering LA.

Hence, the current study aims to 1) examine the impact of flipped instruction on EFL learner autonomy, 2) explore how students' perceptions of autonomy change after

experiencing flipped instruction, and 3) analyze the relationships among individual factors, task-related factors, environmental factors, and learner autonomy in a flipped learning environment.

Literature Review

Flipped Classroom and Learner Autonomy

With the use of information and communication technology (ICT), the flipped classroom (FC) model is a teaching strategy in which students spend more time in class interacting with one another and solving problems (Bergmann & Sams, 2012; Chen et al., 2023; Strayer, 2012, Tsai, 2021; Turan & Akdag-Cimen, 2020). The literature has indicated that the learning advantages of the FC outweigh those of the traditional lecture-based model (Sun et al., 2017). Various studies have shown that FC enhances student academic performance (e.g., Deslauriers & Wieman, 2011; McLaughlin et al., 2013, Schultz et al., 2014; Tutal & Yazar, 2021). A systematic review by Turan and Akdag-Cimen (2020) demonstrated that in the field of language education, the use of FC in English language teaching (ELT) has drawn increased attention from academics since 2014. Most of the analysed studies revealed evidence of positive learning efficiency. Additionally, their review indicated that speaking and writing were the abilities that were most frequently studied.

Students' LA plays a crucial role in foreign/second language learning success (Dang, 2012; Little, 2007; Zainuddin, & Perera, 2019). The definition of LA given by Holec (1981) as "the ability to take charge of one's own learning" (p. 3) has been cited by numerous scholars. It refers to the capacity and duty to make all decisions pertaining to all facets of learning. In other words, autonomous learning is an independent process that focuses on self-directed learning involving setting a concrete objective, making a schedule or setting a goal, selecting suitable learning materials, and evaluating learners' learning methods and procedures. In general, LA can be denoted as an individual's "capacity to take control of one's own learning, to understand how to optimize learning opportunities and to manage one's learning processes actively" (Tsai, 2021, p.3).

At least four distinct viewpoints—psychological, technological, sociocultural, and critical-political—have been used to identify LA in contemporary literature (Benson, 2006; Dang, 2010, 2012; Hamad, 2018; Oxford, 2003; Sinclair, 2009; Tsai, 2021). Psychological LA is mainly concerned with individual psychological or cognitive learning traits, which often include personal beliefs, awareness, reflection or emotional dimensions associated with learning. These are important psychological elements that develop and create the motivation and responsibility for controlling an individual's own learning. Concerning technical LA, some authors contend that learners' behavior or strategies are used to acquire knowledge (Benson, 2006). Dang (2012), on the other hand, emphasizes the features of the learning environment, such as access to learning materials, activities and/or equipment. Sociocultural LA focuses on learners' interactions between a learner and people in a shared space where learning takes place (Dang, 2012). Finally, the critical-political version of the LA is concerned with power, control and ideology. Hamad (2018) asserts that political LA stresses how learners can use

their knowledge to contribute to the wellbeing of their community. From a political perspective, personal growth, transformation and development are essential to the development of society.

There is a close relationship between FC and LA. On the one hand, flipped learning has shifted the control of learning from teachers to students (Sohrabi & Iraj 2016). FC requires learners to preview the learning materials before class; autonomous learning is therefore essential for the success of FC. On the other hand, the integration of FC with educational technology provides flexibility and accessibility for learning resources, which will facilitate LA. For example, Zainuddin and Perera (2019) showed that flipped instruction enhanced the autonomous learning skills of participants in their survey. Several studies (Chen et al., 2014; Han, 2015; Martínez-Fernández et al., 2024) have demonstrated the facilitation of LA in FC instruction. In line with this, Lin and Hwang's (2018) results in the FC also supported the development of students' LA in language learning, with more engagement and contribution inside and outside the classroom. In a recent study exploring the effects of FC on LA, Tsai (2021) found that students started to change their learning processes and thinking modes after FC instruction.

Factors Related to Technology-Assisted Autonomous Learning

Although the above-mentioned studies have presented promising results of enhanced student academic performance through the FC model, diverse findings have been reported (Adnan, 2017; Chan, et al., 2018; Fisher, et al., 2020). The controversial findings of the effectiveness of FC suggest the possibility of factors influencing the implementation of FC. Several studies have explored the relationships between various factors and the effects of flipped instruction. In Kim's (2018) study, the analysis of covariance tests showed that students with different learning styles exhibited different levels of FC satisfaction, while there was no difference in satisfaction among personality traits. Chiu et al. (2023) developed a model to examine the relationships among self-efficacy, flow experience, and learning performance in a flipped programming course. The results indicated that self-efficacy was positively related to enjoyment, engagement and flow control. It is suggested that instructors focus on enhancing students' programming self-efficacy, which will further develop their performance and problem-solving skills. Interestingly, in the EFL context, Shang's (2023) research on flipped writing class revealed that there was no significant effect of metacognitive awareness or self-efficacy on writing performance; however, motivation seemed to significantly affect writing performance.

To identify the factors intertwined with students' engagement in technology-assisted educational environments and support instructors in their efforts to maximize learning outcomes, Carroll and colleagues (2021) proposed an applied model of learner engagement, which includes three major categories of factors: individual factors, factors related to tasks, and environmental factors. While Carroll et al.'s (2021) model was originally developed to investigate learner engagement, it aligns closely with the concept of LA, as engagement is a prerequisite for autonomous learning. The model's three dimensions—individual factors (e.g., motivation, self-efficacy), task-related factors (e.g., challenge, feedback), and environmental factors (e.g., learning resources, teacher support)—all contribute to a learner's ability to take

charge of their own learning process, a core characteristic of LA (Benson, 2006; Holec, 1981). In a FC setting, engagement is critical because students must actively interact with pre-class materials, participate in discussions, and collaborate on problem-solving activities. By examining these factors through Carroll et al.'s framework, this study provides a structured way to explore how engagement mechanisms in FC contribute to the development of LA.

According to Carroll et al.'s (2021) model, individual factors include motivation, cognitive ability, interest, personality, self-efficacy and anxiety. Students' interest in acquiring knowledge is based on their feelings; however, their interaction with people around them will also affect their interest (Lipstein & Renninger, 2007). Akgun and Ciarrochi (2003) suggested that anxiety often has a negative impact on academic performance, but Brigati et al. (2020) reported that anxiety can sometimes trigger students' motivation to perform better. Task factors include challenge, enjoyment, meaningfulness, goals, and feedback. The challenge level of the task may lead to impetus or anxiety of learning. On the other hand, the enjoyment, meaningfulness and specific goals of the task all play a positive role in facilitating learning engagement (Cleary & Zimmerman, 2012). Furthermore, clear feedback is also important because it can help learners better understand how to improve their performance and thus increase their engagement (Noe et al., 2010). Concerning environmental factors, Carroll et al.'s (2021) model includes three factors: autonomy, psychological safety, and support. Hidi and Renninger (2006) alleged that autonomy in the learning environment allows the individual to make the decision to complete the task; therefore, autonomy is "the ability of the individual to control the task" (Carroll et al., 2021, p. 762). A friendly and supportive learning environment can facilitate learners' autonomy and encourage their motivation to learn (Alonso-Tapia & Pardo, 2006; Skinner et al., 2008).

Despite the increasing adoption of FC in language education, limited research has explored its role in fostering LA, especially in EFL contexts. Most existing studies focus on the effects of FC on academic performance, motivation, and engagement, with fewer addressing its impact on different dimensions of LA (Turan & Akdag-Cimen, 2020). Additionally, while previous research has demonstrated the benefits of FC for language learning, little attention has been given to how specific environmental, task-related, and individual factors shape LA in FC settings. Since LA is a key predictor of long-term language acquisition, understanding how FC fosters autonomy beyond general engagement is critical.

This study aims to fill these gaps by examining the relationship between FC and LA in an EFL context. Specifically, it investigates how FC affects different dimensions of LA and explores the key factors—environmental, task-related, and individual—that contribute to autonomy development. By identifying effective pedagogical strategies for fostering LA in flipped instruction, this study provides empirical evidence on how FC can be optimized to enhance autonomous learning.

By building on previous research and addressing these gaps, this study contributes to the broader understanding of how FC can support learner autonomy. The findings will provide practical insights for educators seeking to implement FC effectively to promote autonomy-driven learning experiences, particularly in EFL settings where independent learning skills are essential for language acquisition success.

Hence, this study aims to answer the following research questions:

1. What is the difference in learner autonomy between the experimental and control groups after flipped instruction?
2. In what ways did EFL students change their learner autonomy after flipped instruction?
3. What are the relationships among individual factors, factors related to tasks, environmental factors and EFL students' learner autonomy after flipped instruction?

METHOD

Participants

The participants of the present study comprised 85 undergraduate English majors enrolled in two linguistics courses at a university in Taiwan. The flipped approach was implemented in a linguistics course due to the common challenges linguistics students face with motivation and LA. Research indicates that students in language-related fields frequently struggle with maintaining motivation and self-directed learning (Chamani, et al., 2023). The FC model was therefore adopted to enhance student engagement, foster active participation, and promote self-regulated learning by providing pre-class materials and interactive in-class activities (Tsai, 2021). One class was randomly assigned as the experimental group (EG, n = 48), 10 male and 38 female students (ages ranged from 20 to 23, M = 20.79, SD = 0.801). The other class served as the control group (CG, n = 37), 10 male and 27 female students (ages ranged from 20 to 23, M = 20.97, SD = 0.785). The first researcher was the instructor of the EG, whereas the CG was taught by another professor in linguistics. All participants had studied English for more than ten years (M =11.84, SD = 3.71). To minimize potential biases in this study, the EG and CG were randomly assigned, and different instructors taught each group to reduce selection and instructor-related biases, while ensuring consistency in course content and assessments.

Instructional Design

Experimental Group (FC Instruction)

The operational model of flipped instruction adapted the approach of Tsai (2021), in which out-of-class instruction was characterized by Moodle course management system (CMS)-based technology, while in-class sessions were characterized by collaborative learning. The intervention lasted for one academic semester (18 weeks), with students engaging in flipped instruction for three hours per week. For the EG, the out-of-class assignments included instructor-made video clips, online resources, online quizzes, and learning feedback journals. In line with the weekly topics in linguistics, out-of-class learning materials were provided by online modules on Moodle CMS, including PowerPoint files, prerecorded video clips, and open educational resources obtained from YouTube. For each video, the screencasts were recorded using EverCam screen capture software and a headset with a microphone. After recording and editing, the instructor uploaded the lectures onto YouTube and provided the links on the Moodle CMS. To support students in verifying their conceptual understanding of

the online lectures, ten online quizzes containing multiple-choice questions were created. Furthermore, to reflect on their learning process, the students were required to submit E-journals of learning feedback to Moodle. Before attending class, students were also required to preview the course materials. The in-class activities involved Q&A worksheets, group discussions, group presentations and peer reviews of group presentations. The out-of-class activities included watching teacher-made video clips and online resources, taking online quizzes and submitting learning feedback.

The out-of-class materials, including instructor-made videos, PowerPoint slides, and Moodle-based quizzes, promoted self-paced learning and self-regulation (Zainuddin & Perera, 2019; Lin & Hwang, 2018). In-class activities, such as group discussions, Q&A worksheets, peer reviews, and student-led presentations, encouraged active engagement and responsibility for learning (Benson, 2006; Dang, 2012). Additionally, weekly learning feedback journals helped develop metacognitive awareness, a key component of LA (Holec, 1981). The flipped model effectively supports LA by shifting learning control to students, integrating technology for exploratory learning, and fostering critical engagement with course content (Hung, 2015; Tsai, 2021).

Control Group (Non-FC Instruction)

In comparison, the participants in the CG received traditional teacher-centered instruction with the same textbook and teaching materials as those in the EG. There were major differences between the EG and CG. First, the lectures of the CG were delivered in a traditional classroom, and there were no out-of-class assignments. The students in the CG were not required to preview the textbook material or to submit e-journal of learning feedback. No further instruction was given to the CG outside of class time. Second, the in-class time of the CG was organized differently than that of the EG. There were no Q&A worksheets. After the instructor gave lectures on the topic of the week, the students were assigned to work on textbook exercises individually or in small groups. The teacher then randomly chose students to provide their answers.

Measurements

Questionnaire on Perceived Learner Autonomy

A questionnaire was designed to examine each learner's perception of learning autonomy after the intervention. The questionnaire used in this study was designed based on established frameworks from the literature on learner autonomy (LA), particularly those proposed by Benson and Voller (2014) and Dang (2012). These studies provided theoretical foundations for defining LA in multiple dimensions, including psychological, technical, sociocultural, and critical-political aspects. The questionnaire consisted of four aspects of LA: (1) psychological perspective; (2) technical perspective; (3) social perspective; and (4) critical-political perspective. Each section contained four items, for a total of sixteen items. The items were incorporated into a five-point Likert scale (code 1: strongly disagree; 2: disagree; 3: neutral; 4: agree; and 5: strongly agree). Prior to the instruction, the questionnaire was piloted with five

students who were not the subjects of this study within the same department. All the confusing items were revised according to the students' opinions in the pilot study. The overall reliability of the questionnaire was greater than.92, and Cronbach's alpha values for the psychological, technical, social and critical-political perspectives were 0.92, 0.94, and 0.90, respectively.

Questionnaire on Factors Influencing Learner Autonomy

To explore what factors might influence students' LA, a questionnaire was constructed in the form of a five-point Likert scale based on the theoretical model proposed by Carrol et al. (2019). Three major categories of factors were considered, including individual factors (items 1-12), factors related to tasks (items 13-17) and environmental factors (items 18-20). In addition, one open-ended question was included. The tested reliability indices (Cronbach's alpha) were 0.88 for the overall items, 0.89 for individual factors, 0.92 for factors related to the task and 0.84 for environmental factors. A pilot study was conducted, and problematic items were revised accordingly. One open-ended question was included to elicit participants' opinions about the most important factor influencing their autonomous learning in the flipped instruction.

Procedure

The introduction to the linguistics course was a mandatory course offered for one academic year, which lasted three hours per week for eighteen weeks. The FC instruction was implemented during the second semester for the EG. In the class, the first session involved reviewing the contents of the assigned learning materials. Students were assigned groups to give a group presentation on the main points, one group presentation each week. Then, the instructor commented on the presentation and clarified unclear concepts. However, after the midterm exam (week nine), the students' group presentations were replaced with their prerecorded video clips, which were uploaded to Moodle. In the second period, the students discussed with their group members to answer the questions on a worksheet. During the group discussion, the instructor observed the process and helped the students solve their problems. In the third period, each group exchanged their worksheet with another group for peer review. The instructor then provided the correct answers. After peer review, the worksheet was returned to the group for examination. Students who still had questions stayed for individual consultation with the instructor and teaching assistant. Beyond the regular class sessions, the students were also required to attend the online activities provided on Moodle, such as prerecorded video lectures and PPT materials, writing learning feedback, and taking online quizzes. In contrast, the CG received lecture-based instruction without the support of online materials and activities.

During the first week, the participants in the EG were informed in advance that they would participate in a research project, and they were also informed about the research objectives. In week three, the questionnaire on perceived LA in an all-English version was administered to the EG and CG before instruction began. After the instruction in week seventeen, the same questionnaire was administered to the EG and CG. In addition, the EG was required to complete the questionnaire on factors influencing LA. All necessary ethical

procedures for academic research were considered. The participants were well informed about how personal data would be collected for research purposes only. Upon agreement, they signed the consent forms necessary for their participation in the research and the questionnaire. They were also informed that any data they provided for this study would remain confidential and would be deleted five years after the project terminated.

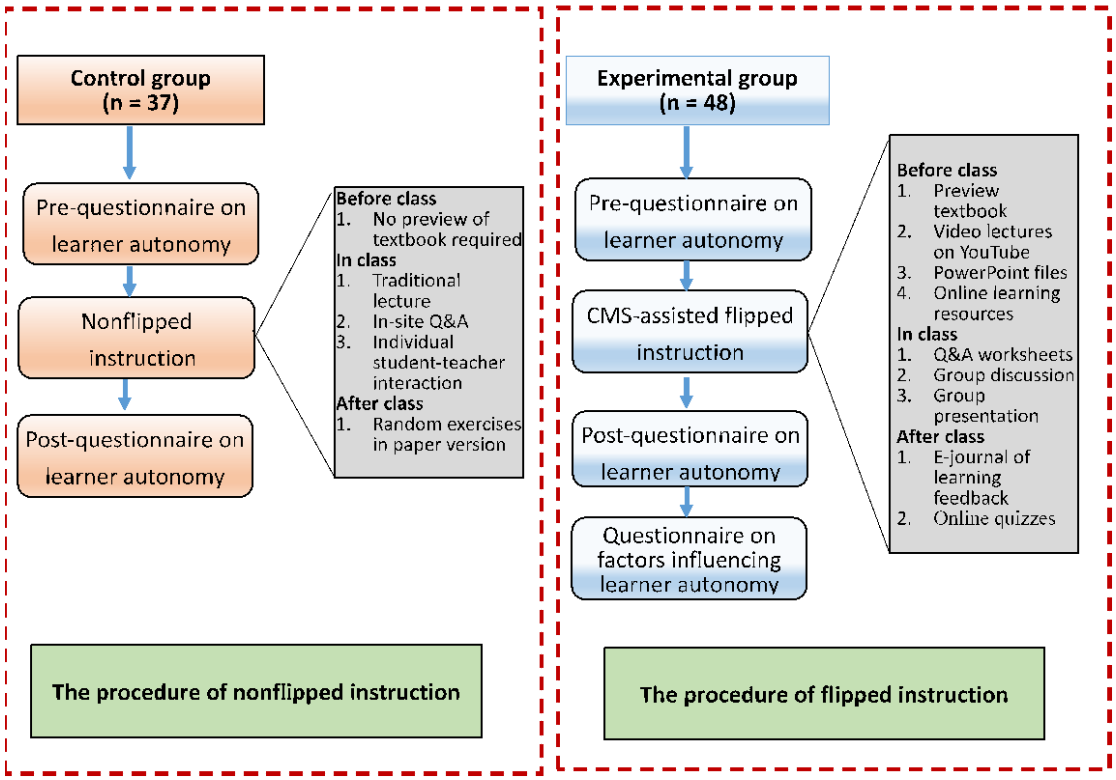

Figure 1. Procedure of the Research

Data Collection and Analysis

Data were collected from 85 undergraduate English majors enrolled in two linguistics courses at a university in Taiwan, with one class randomly assigned as the experimental group (EG, n = 48) using flipped instruction and the other as the control group (CG, n = 37) receiving traditional instruction. A pre- and post-questionnaire was administered to assess LA in four dimensions (psychological, technical, social, and critical-political) using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), with Cronbach's alpha values exceeding 0.92. Another questionnaire measured individual, task-related, and environmental factors influencing LA, with Cronbach's alpha values exceeding 0.88, ensuring reliability. An open-ended question was included to gather qualitative insights on students' perceptions of key influences on their autonomy. Quantitative data were analyzed using SPSS for statistical

testing. Descriptive statistics (mean, standard deviation) summarized questionnaire responses, while independent t-tests compared LA levels between the EG and CG before and after instruction. Paired t-tests examined within-group changes over time, and Pearson correlation analysis determined relationships between LA and influencing factors. To identify key predictors of LA, stepwise multiple regression analysis was conducted.

Following Murray (2020), LA is defined as the ability to take charge of one's learning and exists on a continuum rather than fixed levels. Therefore, this study does not classify LA into discrete levels but instead examines changes in autonomy dynamically by analyzing variations in students' perceived autonomy before and after flipped instruction. The focus is on identifying key influencing factors (psychological, technical, social, and critical-political) rather than imposing artificial cut-off points.

FINDINGS AND DISCUSSION

Findings

Differences in Learner Autonomy between Groups

Descriptive statistics comparing the pre- and post-questionnaire scores on the students' perceptions of LA are presented in Table 1. In general, the means on the post-questionnaire were greater than those on the pre-questionnaire in both groups. The independent samples *t-t*est showed no difference between groups before the instruction ($t = 1.479$, n.s.); however, there was a significant difference after the instruction between the EG and CG in the overall post-questionnaire ($t = 2.496$, $p < .01$). Significant differences between groups were found in all dimensions of the LA post-questionnaire, including psychological perspective ($t = 3.795$, $p < .001$), technical perspective ($t = 3.128$, $p < .01$), social perspective ($t = 2.047$, $p < .05$) and critical-political perspective ($t = 1.017$, $p < .05$).

Table 1. Comparison between the pre- and post-questionnaire scores for the two groups

	CG (*n* = 37)		**EG (*n* = 48)**		***t* test for equality of means**	
	Mean	**SD**	**Mean**	**SD**	***t***	**Sig. (2-tailed)**
Pre P	3.46	.68	3.58	.54	1.532	.156
Post P	3.79	.49	4.16	.52	3.795	.000***
Pre T	3.64	.74	3.68	.45	0.738	.489
Post T	3.55	.75	4.07	.53	3.128	.001**
Pre S	3.69	.82	3.79	.47	0.653	.579
Post S	3.84	.78	3.98	.58	2.047	.015*
Pre C	3.56	.73	3.62	.51	0.912	.403
Post C	3.34	.76	3.87	.33	1.017	.045*
Pre overall	3.59	.63	3.67	.41	1.479	.354

Post overall	3.63	.64	4.02	.35	2.496	.007 **

Note: P: psychological perspective; T: technical perspective; S: social perspective; C: critical-political perspective. * p <.05, ** p < 0.01, *** P <.001.

Differences in Learner Autonomy Before and After Flipped Instruction

To investigate the differences in the participants' perceptions of LA before and after the FC instruction, paired sample t tests were conducted. As shown in Table 2, significant differences were found in the overall survey (t = 2.891, p <.01), psychological perspective (items 1-4, t = 3.714, p <.001), technical perspective (items 5-8, t = 2.897, p <.05), social perspective (items 9-12, t = 2.069, p <.05) and critical-political perspective (items 13-16, t = 2.281, p <.05). Among the 16 items, 13 revealed a difference between the pre- and post-questionnaires. Major differences existed in psychological perspective, where each item in the category showed significant differences, indicating that the learners became more self-disciplined and motivated in learning after their experience in FC instruction.

Table 2. Perception of the experimental group before and after the instruction

Aspects	**Experimental group (n = 48)**					
	Pre- questionnaire		Post-questionnaire		Paired sample t- test	
	M	*SD*	*M*	*SD*	*t*	Sig. (2-tailed)
Psychological perspective	3.58	.54	4.16	.83	3.714	.009***
Technical perspective	3.68	.45	4.07	.77	2.897	.0371*
Sociocultural perspective	3.79	.47	3.98	.85	2.069	.032*
Critical-political perspective	3.62	.51	3.87	.37	2.281	.021*
Overall	**3.67**	**.41**	**4.02**	**.35**	**2.891**	**.009****

Note: * p <.05, ** p <.01, *** P <.001.

The Relationships between the Influencing Factors of Flipped Instruction and Learner Autonomy

Pearson correlation coefficients were calculated to examine the relationships between various factors and LA post-questionnaire scores. The correlations between the factors and LA yielded positive results, as shown in Table 3. The results reveal that LA was highly correlated with environmental factors (r =.587, p < 0.01) and individual factors (r =.541, p < 0.01). There was a moderate correlation between factors related to tasks and LA (r =.436, p < 0.01). Overall, the factors are strongly correlated with learner autonomy (r =.522, p < 0.01).

Table 3. Correlations between factors and LA

	IF	**TF**	**EF**	**All**	**LA**
IF	1				

	IF	TF	EF	All	LA
33TF	.711**	1			
EF	.541**	.428**	1		
ALL	.960**	.849**	.659**	1	
LA	.541**	.436**	.587**	.522**	1

**. The correlation is significant at the 0.01 level (2-tailed).*. Correlations are significant at the 0.05 level (2-tailed). Note. IF: Individual factors, TF: Factors related to task, EF: Environmental factors, LA: Learner autonomy

Among the individual factors, student interest and motivation were most related to LA, followed by confidence and the tendency to work with a group. Intriguingly, personality seems to be unrelated to LA since neither item 6 ('I am an extroverted person.') nor item 7 ('I am an introverted person.') was correlated with LA. Concerning factors related to tasks, the meaningfulness and goals of the tasks were important in enhancing students' LA. Moreover, clear feedback to the questions in the tasks is also essential, which will enhance the students' willingness to solve the problems. In the category of environmental factors, learning resources (item 20) and teachers' responses (item 19) were identified as the most relevant to LA.

Stepwise multiple regression analyses were conducted to determine whether individual factors, factors related to tasks and environmental factors predicted LA in the FC. The overall regression coefficient was.536. Individual factors, factors related to tasks, and environmental factors explained a significant amount of the variance in learner autonomy ($F(3.43) = 7.15$, $p < .05$, $R^2 = .536$, $R^2_{adjusted} = .286$). Only the variable of environmental factors was entered into the regression model (Beta =.519, $t = 4.262$, $p < .001$). Environmental factors significantly affected LA and explained 28.8% of the variance ($R^2 = .288$, $R^2_{adjusted} = .272$, Cohen's $f^2 = .633$), with a large effect size for LA in the FC. Specifically, learning resources (Beta =.402, $t = 2.900$, $p = .006$, $R^2 = .315$) and teacher responses (Beta =.305, $t = 2.202$, $p = .033$, $R^2 = .383$) in the FC were found to affect LA positively and significantly.

Forty-five students responded to the open-ended question, which explored the students' opinions about the influencing factors of LA in flipped instruction. Most of the students agreed that individual and environmental factors strongly influenced LA. The majority of the students (62%) regarded individual factors as the most influential factors. The personality of many students is the key element of LA, which requires certain personal qualities, such as being diligent, industrial, responsible, and self-disciplined. Student 02 explained why personality is important because if the students are lazy, even a perfect course will be useless. Student 8 commented that students' personality determines whether they want to learn. They study hard on their own will, not because somebody tells them to do so. Other students also mentioned the motivation and interest aroused by teaching materials and learning activities, indicating the relevance of extrinsic motivation.

Approximately 30% of the students responded that the learning environment is highly important, emphasizing the teaching materials, learning activities and atmosphere. The students appreciated the quality of the ppt files and pre-recorded videos, which helped them enhance their mastery of the course content. They also admired the abundant learning resources and activities created on Moodle. A number of students referred to LA as peer

pressure and atmosphere. According to student 45, "If the students around you are hard-working and excellent, you will feel embarrassed if you don't study hard. You don't want to be left behind. Students will be influenced by peers easily".

Only 8% of the students responded that factors related to tasks are most related to LA. The students reported that the incorporation of interesting and appealing activities encouraged them to learn automatically. Student 25 mentioned that flexible class time allowed students to identify their weaknesses and strengthen their memory of knowledge through Q&A worksheets. Student 10 referred his learning autonomy to weekly learning feedback journals, which elevated his self-reflection and awareness of the learning process. Other students also remarked on the contribution of online quizzes on Moodle in that they had to apply their knowledge to solve the problems, sometimes with the exploration of other examples or related subjects on the internet.

Discussion

Increased Learner Autonomy from Various Perspectives

Overall, the results indicate that FC instruction seems to support EFL students' LA in four dimensions. First, concerning the psychological dimension, the post-questionnaire data revealed that there were significant differences in the participants' self-discipline and motivation. Increased learning motivation and engagement have been observed in FC instruction in various studies (Lin & Huang, 2018; Zainuddin & Perera, 2019). As mentioned in Shih and Huang (2020), greater flexibility and accessibility to learning materials in the FC offer students more opportunities to take control of their learning. It seems that students would like to take more challenges and that they have become more self-directed in learning. Some students mentioned in the open-ended question that some questions in the Q&A worksheets were too simple. It was suggested that instead of definition questions, more questions that require problem-solving skills can be incorporated. Recent studies on flipped learning have reinforced these findings, showing that self-regulation and motivation increase when learners engage with interactive digital resources and autonomous learning activities (Shang, 2023; Tsai, 2021).

From a technical perspective, the questionnaire data indicate that the participants tended to contribute to the activities of the CMS and use online learning resources to support their learning, outside of class learning resources and materials in a variety of modes that non-FC instruction fails to supply, which encourages more learning opportunities directed by the students themselves. However, there was no change in students' usage of social networking services (SNSs) such as LINE, FB, and IG for learning before and after FC. This finding echoes Dang's (2010) finding that the implementation of FC will likely not change students' online learning habits as a whole. However, Jiang et al., (2022) suggest that digital tools integrated into FC environments can enhance learner engagement, particularly when designed with interactive and adaptive features

The results show that students' LA has been slightly enhanced in sociocultural dimensions. The students responded in the questionnaire that they wanted to interact with their

partners in the group discussion. Increased in-class interaction has been reported in previous research (Adnan, 2017; Bergmann & Sams, 2015; Shih & Huang, 2020). Several students mentioned in the interviews that they benefited greatly from group discussion. They are not afraid of asking the teacher questions. In lecture-based instruction, there is less time and opportunity to interact with the teacher or peers. However, in FC instruction, problems are solved through direct support from the teacher and other students in class. After class, the students found it difficult to convene for discussion about the assignments. The notion that interdependence helps increase LA has been emphasized by several researchers (Benson & Cooker, 2013; Martínez-Fernández et al., 2024) and is an important feature of FC. Furthermore, Chiu et al., (2023) have shown that peer collaboration in flipped learning environments significantly increases students' engagement in knowledge construction and problem solving.

Compared to the previously mentioned three dimensions of LA, the political dimension has received far less attention in the majority of empirical research, as noted by Hamad (2018). According to Nicolaides and Fernandes (2008), political autonomy focuses on how learners can use the knowledge they have acquired to consciously improve the environment where they live. The wellbeing of the system is strongly connected with individual learning, which the learners are responsible for. In this study, students' LA slightly improved from a critical-political perspective. Students have become more aware that their learning or individual growth will contribute to the betterment of society as a whole. Nevertheless, there was no difference on item 16 of the questionnaire on LA, indicating that students' awareness of using their knowledge or ability to improve society remained at the same level after FC instruction. Other authors claim that teachers play a crucial role in the development of students' political LA in that they can empower and encourage learners to transform the condition of their life-world through learning (Hamad, 2018; Lamb, 2008.; Nicolaides & Fernandes, 2008). In this regard, whether FC can positively affect political LA requires evidentiary support from further empirical studies.

Factors Related to Learner Autonomy

Overall, students' LA was significantly correlated with individual factors and factors related to task and environmental factors. Among the individual factors, student interest and tendency to work with a group were most related to LA, followed by confidence in performing tasks in linguistics and motivation to learn. Interestingly, personality seems to be unrelated to LA since neither item 6 ('I am an extroverted person.') nor item 7 ('I am an introverted person.') was correlated with LA. Moreover, in the open-ended question, the majority of the students viewed individual factors, especially motivation, as the major factor of learner autonomy. Concerning factors related to tasks, the meaningfulness and goals of the tasks were important in enhancing students' LA. In other words, the tasks should be connected with the content and goals of learning. Moreover, clear feedback to the questions in the tasks is also essential, which will enhance the students' willingness to solve the problems.

Environmental factors appeared to be highly correlated with students' LA. According to Carroll and colleagues' (2021) model, environmental factors mainly involve autonomy and psychological safety and support. Here, environmental autonomy means allowing individuals

to control their own learning or personalize learning by choosing their own learning tasks and pace (Hidi & Renninger, 2006; Lixia et al., 2024; Rotgans & Schmidt, 2011). On the other hand, psychological safety and support influence learners' engagement and LA. For instance, when students feel safe or encouraged to learn in class, they may not feel demotivated or treated in a negative manner. In this study, both aspects were supported by the data. Most students agreed that the learning resources in the FC are supportive and that the teacher's response motivates them to learn linguistics, which are highly correlated with their LA. They are also not afraid of expressing their own ideas in class. Students who perceive their relationship with their teacher and peers as positive are more willing to be engaged and are more motivated to achieve their learning goals. Additionally, recent research has indicated that the effectiveness of FC in fostering autonomy is closely linked to the quality of teacher-student interactions and the availability of structured support systems (Jiang et al., 2022).

CONCLUSION

The findings of this study provide clear answers to the three research questions. First, students in the EG showed noticeably greater autonomy across psychological, technical, social, and political dimensions compared to the CG. Second, post-instruction comparisons demonstrated improvements in motivation, self-discipline, and engagement, particularly in collaborative learning environments. Third, correlation and regression analyses highlighted the strong influence of environmental factors – especially teacher support and learning resources – on the growth of learner autonomy. These findings reinforce the effectiveness of FC in fostering autonomy and engagement among EFL learners.

The study revealed that through the FC approach, EFL students enhanced LA in various dimensions. From a psychological perspective, FC promoted students' motivation and awareness of taking control of their learning. The use of technology in FC offered fundamental support for autonomous learning from a technical perspective. Furthermore, collaborative discussions and interactions in group tasks enabled students to develop LA socioculturally. Compared to the abovementioned dimensions, political LA has been less observed in this study. Regarding the factors affecting FC, although the quantitative survey data revealed a relatively strong correlation between environmental factors and LA, the majority of the students responded to the open-ended question that personal factors are the most important factor for LA since learning is an individual issue. Overall, the results indicate that FC instruction has created a learning environment in which students feel safe and comfortable personalizing individual learning, which facilitates their learning motivation and engagement so that they can better control and manage their learning—the essence of LA. Among the study's constraints was the fact that the sample size was limited to a single course at a university, making the findings less likely to be generalizable. We therefore recommend that a larger sample be included in future research. The lack of qualitative research examining the factors influencing learner autonomy is another research limitation. Although the positive effects of flipped instruction can be gauged by student outcomes, more objective

measurements are still required to ascertain in more detail what factors can better enhance autonomous learning and learning performance in an FC setting.

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REFERENCES

Adnan, M. (2017). Perceptions of senior-year ELT students for flipped classroom: A materials development course. *Computer Assisted Language Learning*, *30*(3-4), 204-222. https://doi.org/10.1080/09588221.2017.1301958

Akgun, S., & Ciarrochi, J. (2003). Learned resourcefulness moderates the relationship between academic stress and academic performance. *Educational Psychology, 23*(3), 287-294. https://doi.org/10.1080/0144341032000060129

Alonso-Tapia, J., & Pardo, A. (2006). Assessment of learning environment motivational quality from the point of view of secondary and high school learners. *Learning and Instruction, 16*(4), 295–309. https://doi.org/10.1016/j.learninstruc.2006.07.002

Benson, P. (2006). *Learner autonomy 8: Insider perspectives on autonomy in language teaching and learning*. Authentik.

Benson, P., & Cooker, L. (2013). The applied linguistic individual: Gaining perspective. In P. Benson & L. Cooker (Eds.), *The applied linguistic individual: Sociocultural approaches to identity, agency and autonomy* (pp.178-186). Equinox Publishing.

Benson, P., & Voller, P. (Eds.). (2014). *Autonomy and independence in language learning.* Routledge.

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

Bergmann, J., & Sams, A. (2015). *Flipped learning for English instruction.* International Society for Technology in Education.

Brigati, J. R., England, B. J., & Schussler, E. E. (2020). How do undergraduates cope with anxiety resulting from active learning practices in introductory biology? *PLOS ONE*. https://doi.org/10.1371/journal.pone.0236558

Carroll, M., Lindsey, S. Chaparro, M. & Winslow, B. (2021). An applied model of learner engagement and strategies for increasing learner engagement in the modern educational environment. *Interactive Learning Environments*, *29*(5), 751-771, https://doi.org/10.1080/10494820.2019.1636083

Chamani, S., Razi, A., & Xodabande, I. (2023). Motivational and emotional states in self-directed language learning: A longitudinal study. *Discover Education, 2*(1). https://doi.org/10.1007/s44217-023-00048-9

Chan, S. Y., Lam, Y. K., & Ng, T. F. (2018). Student's perception on initial experience of flipped classroom in pharmacy education: Are we ready? *Innovations in Education and Teaching International, 57*(1), 62-73, https://doi.org/10.1080/14703297.2018.1541189

Chen, Y., Wang, Y., & Chen, N. S. (2014). Is FLIP enough? Or should we use the FLIPPED model instead? *Computers & Education, 79*, 16-27. https://doi.org/10.1016/j.compedu.2014.07.004

Chen, Y., Wang, Y., & Chen, N. (2023). Flipped classroom and learner autonomy: A meta-analysis in EFL settings. *Journal of Educational Technology & Society, 26(*1), 45-58. https://doi.org/10.1080/15391523.2023.2264984

Chiu, P. S., Zhong, H. X., & Lai, C. F. (2023). Investigating the effects of a programming course using flipped learning. *Innovations in Education and Teaching International, 60*(4), 578-590. https://doi.org/10.1080/14703297.2022.2080097

Cleary, T.J., Zimmerman, B.J. (2012). A cyclical self-regulatory account of student engagement: Theoretical foundations and applications. In Christenson, S., Reschly, A., Wylie, C. (Eds). *Handbook of Research on Student Engagement* (pp. 237-257). Springer. https://doi.org/10.1007/978-1-4614-2018-7_11

Dang, T. T. (2010). Learner autonomy in EFL studies in Vietnam: A discussion from a sociocultural perspective. *English Language Teaching, 3*(2), 3–9. https://doi.org/10.5539/elt.v3n2p3

Dang, T. T. (2012). Learner autonomy: A synthesis of theory and practice. *The Internet Journal of Language, Culture and Society, 35*, 52–67. https://www.researchgate.net/publication/298092439_Learner_autonomy_A_synthesis_of_theory_and_practice

Deslauriers, L., & Wieman, C. (2011). Learning and retention of quantum concepts with different teaching methods. *Physical Review Special Topics, Physics Education Research, 7*, 1–6. https://doi.org/10.1103/PhysRevSTPER.7.010101

Fisher, R. L., LaFerriere, R., & Rixon, A. (2020). Flipped learning: An effective pedagogy with an Achilles' heel. *Innovations in Education and Teaching International, 57*(5), 543-554. https://doi.org/10.1080/14703297.2019.1635904

Hamad, K. A. (2018). *Understanding the situation of learner autonomy within the context of higher education in Kurdistan-Iraq*. [Doctoral dissertation, The University of Exeter, Exeter, UK]. https://ore.exeter.ac.uk/repository/handle/10871/33927

Han, Y. J. (2015). Successfully flipping the ESL classroom for learner autonomy. *NYS TESOL Journal, 2*(1), 98-109. https://journal.nystesol.org/index.php/NYSTJ/article/view/153

Hidi, S., & Renninger, K. A. (2006). The four-phase model of interest development. *Educational Psychologist, 41*(2), 111–127. https://doi.org/10.1207/s15326985ep4102_4

Holec, H. (1981). *Autonomy and foreign language learning*. Published for and on behalf of the Council of Europe by Pergamon Press.

Hung, H. T. (2015). Flipping the classroom for English language learners to foster active learning. *Computer Assisted Language Learning, 28*(1), 81–89. https://doi.org/10.1080/09588221.2014.967701

Jiang, M. Y., Jong, M. S., Lau, W. W., Chai, C., Liu, K. S., & Park, M. (2022). A scoping review on flipped classroom approach in language education: challenges, implications and an interaction model. *Computer Assisted Language Learning*, *35(*5-6), 1218-1249. https://doi.org/10.1080/09588221.2020.1789171

Kim, J. Y. (2018). A study of students' perspectives on a flipped learning model and associations among personality, learning styles and satisfaction. *Innovations in Education and Teaching International, 55*(3), 314-324. https://doi.org/10.1080/14703297.2017.1286998

Lamb, T. (2008). Learner autonomy and teacher autonomy: Synthesizing an agenda. In T. Lamb & H. Reinders (Eds.). *Learner and teacher autonomy: Concepts, realities and responses* (pp. 269-285). John Benjamins Publishing.

Lin, C. J. & Hwang, G. (2018). A learning analytics approach to investigating factors affecting EFL students' oral performance in a flipped classroom. *Journal of Educational Technology & Society*, *21*(2), 205-219. https://www.proquest.com/scholarly-journals/learning-analytics-approach-investigating-factors/docview/2147859362/se-2

Lipstein, R. L., & Renninger, K. A. (2007). Interest for writing: How teachers can make a difference. *The English Journal, 96*(4), 79-85. https://doi.org/10.58680/ej20075770

Little, D. (2007). Language learner autonomy: Some fundamental considerations revisited. *Innovation in Language Learning and Teaching, 1*(1), 14–27. https://doi.org/10.2167/illt040.0

Lixia, C., Ismail, L., & Noordin, N. (2024). Factors influencing EFL students' motivation to communicate in flipped learning: A mixed methods case study of an English debate course in China. *International Journal of Academic Research in Business & Social Sciences, 14*(11), 2185-2209. http://dx.doi.org/10.6007/IJARBSS/v14-i11/23510

Martínez-Fernández, J. R., Noguera-Fructuoso, I., Ciraso-Calí, A., & Vega-Martínez, A. (2024). An exploratory study of university students' regulation profiles and satisfaction with flipped classrooms. *Revista Española de Pedagogía*, *82*(287), 111-124. https://doi.org/10.22550/2174-0909.3931

McLaughlin, J. E., Griffin, L. M., Esserman, D. A., Davidson, C. A., Glatt, D. M., Roth, M. T., Gharkholonarehe, N., & Mumper, R. J. (2013). Pharmacy student engagement, performance, and perception in a flipped satellite classroom. *American Journal of Pharmaceutical Education, 77*(9), 1-8. https://doi.org/10.5688/ajpe779196

Murray, G. (2020). *Learner autonomy and Holec's model: A complexity perspective.* In M. J. Raya & F. Vieira (Eds.), *Autonomy in language education* (pp. 89-102). Routledge. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429261336-8/learner-autonomy-holec-model-garold-murray

Nicolaides, C.S., & Fernandes, V. (2008). Learner autonomy in the light of Freire. *DELTA: Documentação de Estudos em Lingüística Teórica e Aplicada, 24*(SPE), 493-511. https://doi.org/10.1590/S0102-44502008000300006

Noe, R. A., Tews, M. J., & McConnell, D. (2010). Learner engagement: A new perspective for enhancing our understanding of learner motivation and workplace learning. *Acad Manage Anal, 4*(1), 279–315. https://doi.org/10.1080/19416520.2010.493286

Oxford, R. (2003). Toward a more systematic model of L2 learner autonomy. In D. Palfreyman & R. Smith (Eds.), *Learner autonomy across cultures: Language education perspectives* (pp. 75-91). Palgrave Macmillan.

Rotgans, J. I., & Schmidt, H. G. (2011). Cognitive engagement in the problem-based learning classroom. *Advances in Health Sciences Education, 16*(4), 465–479. https://doi.org/10.1007/s10459-011-9272-9

Schultz, D., Duffield, S., Rasmussen, S., & Wageman, J. (2014). Effects of the flipped classroom model on student performance for advanced placement high school chemistry students. *Journal of Chemical Education, 91*(9), 1334-1339. https://doi.org/10.1021/ed400868x

Shang, H. F. (2023). Flipped instruction: Factors affecting the effects of EFL writing performance. *Innovations in Education and Teaching International, 62*(1), 16-30. https://doi.org/10.1080/14703297.2023.2283608

Shih, H.-C. J. & Huang, S.-H. C. (2020). College students' metacognitive strategy use in an EFL flipped classroom. *Computer Assisted Language Learning, 33*(7), 755-784. https://doi.org/10.1080/09588221.2019.1590420

Sinclair, B. (2009). The teacher as learner: Developing autonomy in an interactive learning environment. In R. Pemberton, S. Toogood, & A. Barfield (Eds.), *Maintaining control: Autonomy and language learning* (pp. 175-198). Hong Kong University Press.

Skinner, E., Furrer, C., Marchand, G., & Kindermann, T. (2008). Engagement and disaffection in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology, 100*(4), 765–781. https://doi.org/10.1037/a0012840

Sohrabi, B., & Iraj, H. (2016). Implementing flipped classroom using digital media: A comparison of two demographically different groups perceptions. *Computers in Human Behavior, 60*, 514-524. https://doi.org/10.1016/j.chb.2016.02.056

Strayer, J. F. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. *Learning Environments Research, 15*(2), 171–193. https://doi.org/10.1007/s10984-012-9108-4

Sun, J. C. Y., Wu, Y. T., & Lee, W. I. (2017). The effect of the flipped classroom approach to OpenCourseWare instruction on students' self‐regulation. *British Journal of Educational Technology*, *48*(3), 713-729. https://doi.org/10.1111/bjet.12444

Tang, T., Abuhmaid, A. M., Olaimat, M., Oudat, D. M., Aldhaeebi, M., & Bamanger, E. (2020). Efficiency of flipped classroom with online-based teaching under COVID-19. *Interactive Learning Environments*, *31*(2), 1077-1088. https://doi.org/10.1080/10494820.2020.1817761

Tecedor, M. & Perez, A. (2019). Perspective on flipped L2 classes: implications for learner training. *Computer Assisted Language Learning*, *34*(4), 506-527. https://doi.org/10.1080/09588221.2019.1626439

Tsai, Y. R. (2021). Promotion of learner autonomy within the framework of a flipped EFL instructional model: Perception and perspectives. *Computer Assisted Language Learning*, *34*(7), 979-1011. https://doi.org/10.1080/09588221.2019.1650779

Turan, Z., & Akdag-Cimen, B. (2020). Flipped classroom in English language teaching: A systematic review. *Computer Assisted Language Learning*, *33*(5–6), 590–60. https://doi.org/10.1080/09588221. 2019.1584117

Tutal, Ö., & Yazar, T. (2021). Flipped classroom improves academic achievement, learning retention and attitude towards course: a meta-analysis. *Asia Pacific Education Review*, *22*, 655–673. https://doi.org/10.1007/s12564-021-09706-9

Xiao, L., Larkins, R., & Meng, L. (2018). Track effect: Unraveling the enhancement of college students' autonomous learning by using a flipped classroom approach. *Innovations in Education and Teaching International, 55*(5), 521-532. https://doi.org/10.1080/14703297.2017.1415815

Zainuddin, Z., & Perera, C. J. (2019). Exploring students' competence, autonomy and relatedness in the flipped classroom pedagogical model. *Journal of Further and Higher Education, 43*(1), 115–126. https://doi.org/10.1080/0309877X2017.1356916