

RESEARCH

Open Access



# The impact of mediated learning on the academic writing performance of medical students in flipped and traditional classrooms: scaffolding techniques

Laleh Khojasteh<sup>1\*</sup> , Seyyed Ali Hosseini<sup>2</sup> and Elham Nasiri<sup>1</sup>

\* Correspondence: [Khojastehlaleh@yahoo.com](mailto:Khojastehlaleh@yahoo.com)

<sup>1</sup>Department of English Language,  
School of Paramedical Sciences,  
Shiraz University of Medical  
Sciences, Shiraz, Iran  
Full list of author information is  
available at the end of the article

## Abstract

Writing as a multiple-step process is one of the most complex and demanding skills for graduate students to master. Foreign or second language learners who are required to write for academic purposes at the university level may even find it more demanding to master. One of the ways of decreasing the burden of mastering this skill for learners is mediation, using scaffolding techniques to teach writing. Hence, having a good understanding of the impact(s) of adopting mediating or scaffolding techniques in writing classes is absolutely indispensable. To this end, the present study employed an experimental research design to investigate the impact of mediation in the flipped writing classrooms of the students of medicine. To pursue this goal, 47 medical students were selected through purposive sampling and put into control and treatment groups. Medical students in the treatment group watched teacher-made video content(s) before their writing classes. The students in this group experienced organized-interactive writing group activities in their classes. Unlike the experimental group, the students in the control group received all the instructions in the classroom and were assigned homework. The findings obtained through the ANOVA and t-test indicated that the students in the experimental group significantly outperformed their counterparts in the control group in terms of their writing. A probable conclusion could be that by requiring students to study in advance and take responsibility for their learning, flipped classroom can provide the opportunity for learners to actively construct knowledge rather than receive the information passively in the classroom. Flipped classroom can also cultivate interactive class time for teachers and enable them to invest in more fruitful academic practices, instead of asking students to spend a substantial amount of time each week doing homework independently.

**Keywords:** Academic writing, Flipped classroom, Mediated learning, Scaffolding

## Introduction

Scholarly writing presented in reports, essays, dissertations, and journal articles is a necessity for interpersonal communication in the scientific community. Lack of expertise or unfamiliarity with the principles of academic writing can seriously harm mutual understanding and hinder the smooth transition of the intended message (Kafipour, Mahmoudi, & Khojasteh, 2018).

Writing as a multiple-step process is one of the most complex and demanding skills for graduate students to master, particularly for L2 learners who need to write for academic purposes at the university level (Barroga & Mitoma, 2019). These students need to learn not only how to write in English, but also how to apply academic terminology, writing conventions, and higher-order thinking skills if they intend to have a voice in the disciplinary communities. Among other things, the students' inability to master writing and the problems associated with it can be attributed to the lack of an explicit and systematic writing instruction for graduate students (Harris, 2006). Academic writing poses a daunting challenge to students because the rules of the "game" are almost all implicit (Casanave, 2002, p.19). Not only students but writing instructors teaching mixed-ability classes face the same dilemma of motivating all students to write well in English across diverse settings and for diverse audiences.

Mediation, as a scaffolding literacy process, is considered as one of the ways through which students, previously challenged with academic writing, can produce high-quality work and present their findings in scientific discourse (Rose, 2002). Closely related to the concept of mediation is scaffolding, which originated from the work of Wood, Bruner, and Ross (1976) who used this metaphor to describe a situation in which a teacher assists their students to master certain skills until they become capable of performing them independently.

The skilful gradual withdrawal of the support or scaffold is the common key feature in scaffolding techniques if the responsibility is to be successfully transferred from the veteran (teacher) to the novice (learner(s)). Based on the kind of support given to the novice, scaffolding can be divided into hard and soft types, (Saye & Brush, 2002). In the former, which is dynamic, situation-specific support is provided by the veteran during the learning process. In the latter, which is static, scaffolds are pre-planned and tailored based on the learners' specific needs. This implies that the main difference between the two types of scaffolding is planning and the timing of the scaffolds provided.

Taking into account both the support quality and the time allocated to independent working, it is often argued that scaffolding, particularly the hard type, is very time-consuming. Since scaffolding is rather a process than a product, it requires substantial time and effort to adequately model the desired sequential series of strategies and pre-planned activities that are gradually reduced by the instructor when the appropriate time comes. Unfortunately, allocating this amount of time for deep learning at the university level with its jam-packed syllabi is almost impossible.

One of the challenges that confront writing instructors at Shiraz University of Medical Sciences is that the writing syllabus is often too packed to enable writing instructors to appropriately apply the mediation the medical students need. Therefore, lack of ability in generating, developing, clarifying, and organizing their ideas in an academically persuasive manner is evident in medical students' writing outputs. Some studies have attributed this problem to the lack of explicit and systematic instruction in

academic writing, lack of motivation, and lack of purpose in writing in the target language (i.e., Khojasteh, Shokrpour, & Kafipour, 2018). Moreover, the majority of medical students in Iran, particularly during the first 2 years of their study, do not have time or inclination to put more effort into their ESP classes.

Flipped classroom can be an alternative to the problem of the time constraint in writing classes. Although flipped classroom does not necessarily involve technology (i.e., Cheng, Ritzhaupt, & Antonenko, 2018; Hew & Lo, 2018), in the present study, a flipped classroom is defined as one in which instructions are delivered in a digital format. In such classes, instructor-made videos are viewed by the students outside the class, and the class time is devoted to organized interactive group activities. With the spread of the Covid-19 pandemic and the restrictions imposed on education, the significance of flipped classroom during the pandemic is even more pronounced. At the same time, the effectiveness of adopting such approaches needs to be scrutinized. The present study was therefore conducted to assess the impact of flipped classrooms on the ESP medical student writing performance.

#### Literature review

Flipped classroom originated from the work of Jonathan Bergmann and Aaron Sams who used pre-recorded chemistry lectures to provide instruction to their students who were missing classes. The teachers were also interested in freeing up class time and devoting it to more fruitful activities that enabled them to consider the subject matter (chemistry) more comprehensively (Bergmann & Sams, 2012). Reportedly, flipped classroom boosts motivation and promotes autonomy as well as achievement in students because it not only provides opportunities for students to feel experienced in their ability, but also causes them to feel connected to their peers and teachers during the period of learning (see Hung, 2015; Murray, Koziniec, & McGill, 2015; Yang, Yin, & Wang, 2018).

Although, reportedly, teachers might face pedagogical, cognitive, and ergonomic challenges while implementing technology in their classes, students generally gain a lot when innovative educational techniques are utilized by teachers (Eshet, 2004, 2007; Koehler & Mishra, 2009). Zheng, Chu, Wu, and Gou (2018), for example, reported that the combination of offline and flipped classroom activities enhanced students' learning outcomes and achievements. This is supported by another study carried out by AlJaser (2017) who reported that implementing flipped classroom made learning more productive for her students and made teaching and lecturing more interesting to her. A plethora of other studies have reported similar findings (i.e., Al-Zahrani, 2015; Basal, 2015; Elian & Hamaidi, 2018; Evseeva & Solozhenko, 2015 to name a few). However, studies addressing the implementation of flipped classroom for teaching academic writing at higher education are scarce. The present study therefore intends to address flipped classroom with respect to ESP writing classes. It was assumed that flipping the classes would create more room for implementing specific scaffolding techniques such as modelling, bridging, contextualization, schema-building, and text representation. A further assumption was that mediation would motivate or increase the motivation of demotivated or less motivated medical students and increase the chances of guided academic writing instruction.

The present study intended to investigate whether mediation in flipped writing classroom is more effective than conventional classrooms in improving the students' writing performance. The writing performance of students in the control group and experimental group was compared to identify the probable impact of mediation in the flipped classroom. The objectives of the study can be formulated into the following research questions.

### Research questions

1. Does mediation have any effect on the medical students' writing in the flipped classroom?
2. Is there any difference between the writing performance of medical students in flipped and traditional classroom?
3. If any, which writing component(s) (content, organization, vocabulary, language use, and sentence mechanics) are more affected by mediation in flipped writing classroom of medical students?

According to the above research questions, the following hypotheses have been suggested:

1. Mediation has no effect on medical students' writing in the flipped classroom.
2. There is no difference between the writing performance of medical students in flipped and traditional classroom.
3. None of the writing components is affected by mediation in flipped writing classroom of medical students.

## Method

### Design of the study

The present study investigated the effect of mediation in flipped writing classroom of medical university students. An experimental research design was used to compare the experimental group (a combination of mediation and flipped classroom) with the control group (traditional writing instruction).

### Participants

The study favored 47 medical students who enrolled in a 3-unit compulsory writing course as a prerequisite for the fulfillment of a degree at Shiraz University of Medical Sciences in the spring semester of 2019–2020. To control instruction effects, purposive sampling was implemented to select two writing classes that were instructed by the same writing instructor from among the six offered courses. The experimental and control groups consisted of 25 and 22 male and female students respectively.

To ensure that the participants were homogenous in their writing ability, they were required to complete a writing task before instruction. Later, the writings were marked and analyzed by an independent sample t-test. Since the  $p$ -value between the two writing groups was 0.408, it was concluded that the two writing groups were homogenous.

## **Instruments**

### ***Medical students' writing prompts***

To assess the students' writing level before instruction and make further comparisons possible, the students were asked to write a paragraph on childhood obesity as a serious problem in many countries at the beginning of the semester. They were asked to explain the main causes of this problem, elaborate on its effects, and suggest some possible solutions. With respect to the students' major and the fact that they had already passed the nutrition course in the previous year, it was assumed that the students possessed the necessary background knowledge to complete the task appropriately.

The other implemented instrument was the students' writings on the midterm exam. The students in both the experimental and control groups were asked to write on the topic of health promotion and whether they felt that it needed to be built into all the policies.

The midterm exam was given after 3 months (12 weeks) from the beginning of the semester. The reason for specifying a 12-week time interval can be attributed to the fact that a 6- to 8-week intervention has generally been considered appropriate for experimental studies (Chwo, Marek, & Wu, 2018). Besides, a 12-week time interval can minimize the novelty effect.

### ***Writing grading rubric***

The Analytic Rubric (Jacobs et al., 1981) was used to score the participants' writing samples. The scale assesses writing ability using the traits of content, organization, language use, vocabulary, and mechanics. In this rubric, the content section assesses knowledgeable, substantive, and thorough development of the thesis statement. The organization part assesses the fluency of expression, clarity in the statement of ideas, support, organization of ideas, and sequencing and development of ideas. The vocabulary part looks at the sophisticated range, effective word choice, word form mastery, and appropriate register. The language use section is concerned with the use of effective complex construction, agreement, tense, number, and word order. The mechanics section deals with spelling, punctuation, capitalization, and paragraphing. The scores which are allocated to each trait are as follows: content, 25; organization, 25; language use, 25; vocabulary, 15; and mechanics, 10. The total mark was 100 points.

### ***Writing video contents used in the flipped classroom***

According to the educational rules and regulations of Iranian medical universities, 30% of the writing instructions in all majors in medical universities in Iran could be flipped, so out of 17 weeks of writing instruction comprising of 34 90-min session writing lessons, 6 sessions were flipped using pre-recorded grammar lessons recorded professionally in the Virtual University of Medical Sciences. These lessons were uploaded to Navid (<http://sumsnavid.vums.ac.ir/>) which is a learning management system used by all medical universities across Iran. Accessing Navid requires the student's ID number and the self-created password. The videos were uploaded and made accessible only to the students of the experimental group. To ensure that the students in the control group could not access the files on Navid, the download option was disabled. Furthermore, since the research design of the present study required the students to watch the

videos prior to attending writing class, their viewing habits were monitored through Navid, and reminders were sent to those who had not watched the videos.

Note that all of the writing videos uploaded to Navid were recorded and edited professionally at Virtual University of Medical Sciences and approved by the advisory committee there. More information regarding the software used for making videos and the snapshots of the introductory video uploaded to Navid can be seen in Appendices 1 and 2. The syllabus given to the students of the experimental group at the beginning of the semester can be seen in Appendix 3 in Table 6.

#### ***Data collection procedure***

To collect the data, the participants were divided into two groups as the control in which the traditional instruction was carried out and the experimental group in which the flipped classroom was conducted. The researchers explained the objectives and benefits of the study, and then, a consent form was distributed to seek the participants' permission and tendency to be included in the study. Before an experiment, both groups were asked to write a paragraph. Then, the researchers started the experiment which lasted for six 90-min sessions in 4 weeks. The experimental group received flipped classroom, whereas the control group received traditional instruction. After that, the students were asked to write a paragraph again on a specific topic explained in the earlier section to collect the data after the treatment (posttest).

#### **Intervention**

##### ***Experimental group treatment: mediation in the flipped classroom***

For this study, students were required to have already watched the assigned videos completely before attending their writing class. They were asked to watch typically 20–30-min video lectures of instructions in six 90-min sessions covering a particular topic including different types of sentences in English, parallel structure, subject-verb agreement, noun clauses, adjective clauses, and adverbial clauses.

To ensure allocating equal class time for experimental and control groups, the time students spent watching clips related to each session was deducted from their class time, and the remaining was spent to do exercises. Thus, when attending the flipped classroom sessions, students were required to do class exercises (such as editing and re-writing paragraphs) provided by their writing instructor individually or in groups. In this way, the writing contents that were usually taught by the writing instructor in the classroom were covered by students themselves at home, and the assignments that were typically done at home were covered and supervised by the writing instructor in the classroom. A thorough sample of how one or two writing sessions proceeded is discussed in the following parts.

##### ***Second week/first mediation***

Using modeling as one of the major scaffolding techniques in writing, the students were required (in pairs/groups) to study certain sentences in the prompt and identify certain features (Appendix 4).

Using teacher-student and student-student conferencing strategy, the students were asked to reflect on their tasks (connecting the sentences). The writing instructor offered



further on the spot explanation and guided the students, if necessary (Le & Nguyen, 2010). The assistance was gradually withdrawn as the students internalized the patterns (Lipscomb, Swanson, & West, 2010).

While the students were reading and discussing the punctuation or grammatical points, the teacher explained and discussed the errors to the students. Errors like fragments, comma splices, run-ons, and stringy sentences were also extensively discussed. This scaffolding technique is called “offering explanation” and includes explicit teaching to develop the students’ understanding of declarative knowledge, conditional knowledge, and procedural knowledge (Roehler & Cantlon as cited in Dewi, 2013).

Finally, using talk-aloud modeling, the writing instructor showed the medical students the original model of the paragraph to explicitly explain, analyze, and discuss the genre, academic vocabulary used, and grammatical patterns applied in the model (Lange, 2002).

#### ***Fourth week/second mediation***

To further explore and practice the video contents, the students were asked to read a paragraph about aspirin and not only use the strategies that they had been taught previously to make the paragraph more coherent, but also expand the paragraph by adding more information to and punctuate it appropriately. This scaffolding technique which is called “Joint Construction” is the strategy in which the writing instructor helps the students to construct a similar text within the given text. To give the students a better understanding of aspirin, a video was shown to them twice (<https://www.uspharmacist.com/article/lowdose-aspirin>), and they were asked to write down whatever information they thought might help them write a paragraph on aspirin using different types of sentences. Using this scaffolding technique, which is called “Contextualization,” the writing instructor provided sensory context by using pictures, manipulatives, film, or authentic objects to enhance the students’ understanding and made the concepts more relatable. The “schema-building strategy” was also used to discuss and brainstorm the topic in pairs or groups. This strategy can lead to the activation of the students’ schemata (Sun, 2014).

#### **Control group: traditional writing instruction**

The students in the control group received conventional instruction consisting of teaching all the contents covered by the experimental group (the structure of the paragraph, process paragraph, compare and contrast paragraph). However, the grammatical lessons including sentence types, parallel structure, subject-verb agreement, adjective clauses, noun clauses, and adverbial clauses were fully covered in the classroom through six 90-min sessions, and the assignments were assigned as homework as the instructor was involved in teaching the materials in the classroom and there was limited time for doing assignments as classwork. In the following sessions, the writing instructor provided the answers to the students in the classroom and ensured they did not have any problems accordingly.

#### **Inter-rater reliability**

Since the students’ pretests and posttests were analyzed and marked by two human raters (university lecturers), the inter-rater reliability was calculated (Neuendorf, 2002).

Before marking the papers, the researchers discussed the writing rubric with the two raters comprehensively. To ensure the homogeneity of the scoring procedures, the raters were asked to mark two paragraphs using the rating rubric. Then, 47 assignments of the pretest and 47 assignments of the posttest were given to the raters, and a month deadline was determined for the writing rubric to be checked for each paper.

To assess the inter-rater reliability, Pearson product-moment correlation was calculated based on the average ratings on scores for the six individual components of each writing task. To this end, inter-rater reliability of the scores given by the two raters was examined. The reliability for total score was .678. The reliability for the components of content, organization, word choice, sentence structure, grammar, and mechanics was .681, .647, .743, .618, and .698 respectively. This is indicative of a high consistency between the two raters with respect to rating the participants' knowledge of writing and its components. Moreover, the correlation coefficients were all significant indicating that both raters were significantly consistent in scoring the participants' writing tasks.

#### **Data analysis**

The data analysis was conducted in two phases. In the initial phase, the data were checked for the normal distribution assumption using a one-sample Kolmogorov-Smirnov test. According to the results of this test, the distribution of the scores was not normal, so non-parametric test including the Wilcoxon and Mann-Whitney test were used. In the next phase, descriptive statistics and the Wilcoxon signed-rank test were run to see whether mediation had any significant effect on different aspects of medical students' writing in flipped classroom. Mann-Whitney test was also used to identify any significant difference between the writing performance of medical students in flipped and traditional classrooms. ANOVAs were also run to determine which writing component(s) (content, organization, vocabulary, language use, and sentence mechanics) were/was more affected by mediation in the flipped writing classroom. Caution was exercised to control the effect of pretests or computer difference between posttest and pretest mean scores (by Mann-Whitney test).

#### **Results**

First, normality of the scores was examined to specify if parametric or non-parametric tests should be used. A one-sample Kolmogorov-Smirnov test was conducted to test normality of the scores. According to the results of the test (Appendix 6 in Tables 8, 9, 10, 11, 12, 13), the scores were not normally distributed, so non-parametric tests were used in the present study.

The results of the descriptive statistics (Table 1) show that the means for different components of the students' writing and their writing performance before attending flipped classes were lower than their means after instruction.

To see if the difference between pre- and posttest scores was statistically significant, Wilcoxon test was conducted. As the P values for all components of writing and the students' writing performance were found to be lower than .05, it is concluded that these differences are statistically significant. This is indicative that the students showed a better writing performance after enrolling in the flipped classroom (see Table 2).







students' performance by saving more time for actual writing tasks and being involved in exercises compared to traditional classrooms in which the students do not have much opportunity to ask or answer questions (van Alten, Phielix, Janssen, & Kester, 2019). According to Schmidt, Wagener, Smeets, Keemink, and Van Der Molen (2015), the cognitive load associated with performing simultaneous tasks (i.e., teaching and class activity) in the classroom lowers the active construction of knowledge. Delivering instructions through student-controlled video lessons can compensate for this and increase information processing (Abeysekera & Dawson, 2015). Although Lai and Hwang (2016) believe that flipped classroom might be disadvantageous for students who have less learning autonomy in terms of self-regulated abilities, the result of the present study showed that since students are actively and collaboratively constructing meaning while doing the activities in the flipped classroom, knowledge is stored in their long-term memory, resulting in better performance. Using scaffolding techniques to gradually build upon students' prior knowledge, teachers can actively guide the students throughout the class, the role which is absent when students independently work on their assignments after class.

Various writing mediations from modelling, asking students to apply knowledge to similar contexts, comparing and contrasting their writings with the original samples, dialoging, discussing and co-creating knowledge with their peers, etc. were used by the teachers in their classes in the present study. This is in line with a study conducted by Van den Bergh, Ros, and Beijaard (2014) who reported that the most ingredient of active learning is the provision of effective feedback on the behalf of the teacher. The authors concluded that there will be more room for this type of feedback when the class is flipped.

Contrary to Heyma et al. (2015) who reported that face-to-face classroom time was reduced by two-thirds in the flipped classroom, and, as a result, the students had a poor performance compared to the time they were traditionally instructed, we believe that since these students were secondary students, they still had not the ability to take responsibility for their learning, which might be in disagreement with studies reporting that flipped classroom can be equally effective in lower levels of education (see Lo & Hew, 2017 for instance).

#### **Class size effect and effectiveness of the activities**

Although the present study's small sample size might be considered as one of its limitations, the authors believe that the obtained results in the flipped writing classes can be attributed to the small number of students in these classes. This notion correlates with Schmidt et al. (2015), who stated that class size and lecture activities can have a significant role in the effectiveness of flipped classroom outcomes. The smaller class size can lead to more effective activities, which ultimately bring about better performance.

#### **Effects of flipped classroom on writing components**

The findings also illustrate that in descending order "content," "organization," "language use," "vocabulary," and "mechanics" have been affected by flipped classroom. Despite the authors' prior assumptions that "language use" would be the most affected writing component (because all of the multimedia contents used in the study were

related to language use), the results indicated that “content” and “organization” were mostly affected by the mediation in flipped classrooms. This is in line with Aziz Faraj (2015) who concludes that when students’ role changes from passive learners to active ones in generating their meanings in writing, their focus shifts from “mechanics” to “content” and “organization”. Although it is generally assumed that lower number of skilled writers focus more on vocabulary and grammatical rules (August, 2002), the findings of the present study suggest that this can be changed when novice writers are offered the appropriate tools and are provided with the right scaffolding techniques.

The greater impact of flipped classroom on the writing components of “content” and “organization” can also be attributed to giving the students numerous editing practices that might have enhanced their self-monitoring skills. Self-assessment practice, according to Cresswell (2000), can engage learners in an evaluation process and encourage responsibility which can eventually lead to fewer content and organization errors in their final product.

The third writing component affected by mediation in flipped classroom was language use. According to Richards and Renandya (2008), “for the L2 students, many writing conventions will remain a mystery unless teachers can bring these forms and patterns of language use to conscious awareness” (p.321). Since meaning is only achieved via language, form is as equally important as content in the final product, so dual focus on content and language should be taken into consideration (Hyland, 2003; Ferris & Hedgcock, 2005).

The two least affected writing components in the present study were “vocabulary” and “mechanics”. In terms of “vocabulary,” one possible assumption is that since the medical students were given health-related topics from the very beginning of the writing course, and since they had already learned the medical and academic vocabularies and register in their clinical textbooks, they were already competent with their word choices, word forms, and register. Olinghouse and Wilson (2013) state that student writers vary in their vocabulary usage based on genre, mostly writing expository topics. In the present study, it is probable that since medical students had been already exposed to various high-level articles, they were able to produce a sophisticated range of vocabularies and appropriate register (Olson and Matuchniak, 2015). As for mechanics, it can be concluded that in a process-oriented approach, it is normally the “content” that is prioritized over grammatical accuracy and mechanics (Ferris, 2011, b).

### **Conclusion and implications**

First, by requiring students to study in advance and to take responsibility for their learning, flipped classroom can provide the opportunity for learners to actively construct knowledge by themselves rather than receiving the information passively in the classroom. Time wise, flipped classroom can cultivate interactive class time for teachers and enable them to invest in more academic practice, instead of asking students to spend a substantial amount of time each week outside the classroom doing homework independently. Second, scaffolding techniques can provide students with a more engaging and effective environment that helps them to have more social interaction while taking ownership of their learning. Through gradual scaffolds, writing instructors can pre-plan and use various instructional modes and means to bridge learning gaps at a certain point in the learning process. The main implication following our results is that flipped classroom should be implemented for higher education with packed syllabi.

### Appendix 1

**Table 5** Information regarding the software used for making videos

Title	Time	Size (Meg)	Platform	Software
UNIT 1-lesson 1: clauses and phrases	5	9	LMS	Articulate Studio
UNIT 1-lesson 2: independent and dependent clauses	6	9	LMS	Articulate Studio
UNIT 1-lesson 3: sentence type	17	20	LMS	Articulate Studio
UNIT 2: parallel structure	26	30	LMS	Articulate Studio
UNIT 3: subject-verb agreement	19	20	LMS	Articulate Studio
UNIT 4: noun clauses	20	21	LMS	Articulate Studio
UNIT 5: adverbial clauses	20	21	LMS	Articulate Studio
UNIT 6: adjective clauses	30	25	LMS	Articulate Studio

### Appendix 2

**Sentence Structure in Academic Writing**

دانشگاه علوم پزشکی شیراز

**This Course Includes the Following:**

- ▶ Unit 1: Types of Sentences
- ▶ Unit 2: Parallelism in Writing
- ▶ Unit 3: Subject-Verb Agreement
- ▶ Unit 4: Noun Clauses
- ▶ Unit 5: Adverbial Clauses
- ▶ Unit 6: Adjective Clauses
- ▶ Unit 7: Participles and Participial Phrases

Dr. Laleh Khojasteh  
Ph.D. in Teaching English  
Assistant Professor

Dr. Nasrin Shokrpour  
Professor in Applied Linguistics

دانشگاه علوم پزشکی شیراز

http://vls.sums.ac.ir  
-Y1-22201612  
-Y1-2224...-22  
-Y1-22261614

The screenshot displays a software interface for a course titled "Sentence Structure in Academic Writing". The interface is framed by a green border with decorative elements. At the top, the title "Sentence Structure in Academic Writing" is prominently displayed in a blue box, accompanied by three circular logos. To the right of the title, the text "دانشگاه علوم پزشکی شیراز" (Shiraz University of Medical Sciences) is visible. Below the title, a green banner states "This Course Includes the Following:". The main content area is divided into two columns of units. The left column lists: "Unit 1: Types of Sentences" (with sub-lessons Lesson 1, Lesson 2, Lesson 3), "Unit 2: Parallelism in Writing" (Unit 2), "Unit 3: Subject-Verb Agreement" (Unit 3), and "Unit 4: Noun Clauses" (Unit 4). The right column lists: "Unit 5: Adverbial Clauses" (Unit 5), "Unit 6: Adjective Clauses" (Unit 6), and "Unit 7: Participles and Participial Phrases" (Unit 7). Each unit title is followed by a button labeled with the unit or lesson number. In the bottom right corner, the authors are listed: "Dr. Laleh Khojasteh, Ph.D. in Teaching English, Assistant Professor" and "Dr. Nasrin Shokrpour, Professor in Applied Linguistics". A vertical sidebar on the right edge contains Persian text: "این نرم افزار با کمک و حمایت مالی از طرف دانشگاه شیراز و مرکز تحقیقات آموزشی و پژوهشی آن طراحی و توسعه یافته است." (This software was designed and developed with the financial support and assistance of Shiraz University and its Educational Research and Research Center.)



### Appendix 3

**Table 6** The writing syllabus given to the experimental group

Week	Content	Lesson delivery
1	Introduction/basics of a paragraph Students were asked to watch video content on "clauses and sentence types"	Verbal
2	1st session      Pre-writing and planning ideas  <b>2nd session      Mediation 1: modelling, teacher-student and student-student conferencing offering explicit explanation, internalization</b>	Verbal  <b>Flipped</b>
3	Building paragraphs with examples (topic sentence, supporting sentences, developing sentences, etc.) Students were asked to watch video content on "Parallel Structure"	Verbal
4	1st session      Description, narration, classification  <b>2nd session      Mediation 2: modelling, joint construction, contextualization, schema-building</b>	Verbal  <b>Flipped</b>
5	Process paragraph Students will be asked to watch video content on "Subject-verb Agreement"	Verbal
6	1st session      Process paragraph  <b>2nd session      Mediation 3: modelling and deconstruction, teacher-student and student-student conferencing</b>	Verbal  <b>Flipped</b>
7	Compare and contrast paragraph Students will be asked to watch video content on "Noun Clauses"	Verbal
8	1st session      Compare and contrast paragraph  <b>2nd session      Mediation 4: modelling, bridging, prompting, negotiation</b>	Verbal  <b>Flipped</b>
9	Argumentative paragraph Students will be asked to watch video content on "Adverbial Clauses"	Verbal
10	1st session      Argumentative paragraph  <b>2nd session      Mediation 5: modelling, bridging, prompting, negotiation</b>	Verbal  <b>Flipped</b>
11	Cause and effect paragraph Students will be asked to watch video content on "Adjective Clauses"	Verbal
12	1st session      Cause and effect paragraph  <b>2nd session      Mediation 6: modelling, bridging, prompting, negotiation</b>	Verbal  <b>Flipped</b>
13	Essay writing	Verbal
14	Essay writing	Verbal
15	Essay writing	Verbal
16	Essay writing	Verbal
17	Essay writing	Verbal

### Appendix 4

#### Model

##### Dangerous Allergies

1 Most people do not think of peanuts when they think of poisons. 2 Serious peanut allergies are putting an increasing number of individuals at risk for death. 3 Between 1997 and 2008, the peanut allergy rate among children in the United States nearly tripled. 4 The problem is causing great concern. 5 There are no signs that the allergy rate will decrease. 6 No one knows for certain why this increase is happening. 7 There are several theories. 8 Some believe that children are becoming more sensitive to allergens and cleaning products, and antibiotic medicines have made our environment too sanitary and this level of cleanliness, some say, leads to an underdeveloped immune system. 9 Another group of theorists believes that the problem lies in the way peanuts are prepared and this argument blames the roasting process for making peanuts more allergic. 10 Because severe allergies have risen at such an alarming rate it is likely that research into the causes of these allergies will grow so science may soon be able to explain why more and more children are threatened by such simple food.

*Taken and modified for this study from Longman Academic Series 4 Book*

1. Identify and briefly explain the individual clauses and sentences in the paragraph
2. Identify and explain the relationship between the sentences that are too short (simple sentences)
3. List what you need to know and/or know how to do to connect the simple sentences to make compound, complex, and compound-complex sentences
4. Connect the sentences with linking words and conjunctive adverbs (look at the handout)
5. Look at sentences 8 to 10, and identify the errors

### Appendix 5

**Table 7** Multiple regression analysis

Source	Type III sum of squares	df	Mean square	F	Sig.	Partial eta squared
Sentence mechanics	26.650	1	26.650	40.219	.000	.472
Organization	950.555	1	950.555	173.583	.000	.794
Content	925.411	1	925.411	190.585	.000	.809
Vocabulary	214.546	1	214.546	50.608	.000	.529
Language use	965.571	1	965.571	138.320	.000	.755

### Appendix 6

**Table 8** Test of normality (pre-content, pre-organization, and pre-vocabulary)

One-Sample Kolmogorov-Smirnov Test						
Instruction			Pre-content	Pre-organization	Pre-vocabulary	
Traditional	N		22	22	22	
	Normal parameters <sup>a,b</sup>	Mean	11.2727	11.6364	7.1818	
		Std. deviation	2.31315	1.98915	1.29601	
	Test statistic		.456	.398	.283	
	Asymp. Sig. (2-tailed)		.000	.000	.000	
Flipped	N		25	25	25	
	Normal parameters <sup>a,b</sup>	Mean	10.6800	10.8800	6.9600	
		Std. deviation	2.79464	1.85562	1.64520	
	Test statistic		.334	.314	.280	
	Asymp. Sig. (2-tailed)		.000	.000	.000	

**Table 9** Test of normality (pre-language use and pre-sentence mechanics)

<b>One-sample Kolmogorov-Smirnov test</b>				
Instruction			Pre-language use	Pre-sentence mechanics
Traditional	N		22	22
	Normal parameters <sup>a,b</sup>	Mean	12.2273	6.0000
		Std. deviation	2.20242	.43644
	Test statistic		.348	.409
	Asymp. Sig. (2-tailed)		.000	.000
Flipped	N		25	25
	Normal parameters <sup>a,b</sup>	Mean	11.1200	6.0000
		Std. deviation	2.04776	.91287
	Test statistic		.283	.340
	Asymp. Sig. (2-tailed)		.000	.000

**Table 10** Normality test (post-content and post-organization)

<b>One-sample Kolmogorov-Smirnov test</b>				
Instruction			Post-content	Post-organization
Traditional	N		22	22
	Normal parameters <sup>a,b</sup>	Mean	15.2273	15.2273
		Std. deviation	2.84407	3.19124
	Test statistic		.243	.232
	Asymp. Sig. (2-tailed)		.001	.003
Flipped	N		25	25
	Normal parameters <sup>a,b</sup>	Mean	24.1200	24.2400
		Std. deviation	1.42361	1.16476
	Test statistic		.372	.343
	Asymp. Sig. (2-tailed)		.000	.000

**Table 11** Normality test (post-vocabulary and post-language use)

<b>One-sample Kolmogorov-Smirnov test</b>				
Instruction			Post-vocabulary	Post-language use
Traditional	N		22	22
	Normal parameters <sup>a,b</sup>	Mean	10.3182	14.6364
		Std. deviation	1.80967	3.10982
	Test statistic		.233	.197
	Asymp. Sig. (2-tailed)		.003	.026
Flipped	N		25	25
	Normal parameters <sup>a,b</sup>	Mean	14.6000	23.7200
		Std. deviation	2.25462	2.15097
	Test Statistic		.390	.276
	Asymp. Sig. (2-tailed)		.000	.000

**Table 12** Normality test (post-sentence mechanics and pre-performance)

<b>One-sample Kolmogorov-Smirnov test</b>				
Instruction			Post-sentence mechanics	Pre-performance
Traditional	N		22	22
	Normal parameters <sup>a,b</sup>	Mean	7.0909	48.3182
		Std. deviation	.92113	6.57112
	Test statistic		.202	.170
	Asymp. Sig. (2-tailed)		.020	.006
Flipped	N		25	25
	Normal parameters <sup>a,b</sup>	Mean	8.6000	45.6400
		Std. deviation	.70711	7.92612
	Test statistic		.274	.223
	Asymp. Sig. (2-tailed)		.000	.002

**Table 13** Normality test (post-performance)

<b>One-sample Kolmogorov-Smirnov test</b>				
Instruction				Post-performance
Traditional	N			22
	Normal parameters <sup>a,b</sup>	Mean	62.5000	
		Std. deviation	9.20533	
	Test statistic			.142
	Asymp. Sig. (2-tailed)			.200
Flipped	N			25
	Normal parameters <sup>a,b</sup>	Mean	95.2800	
		Std. deviation	3.84621	
	Test statistic			.193
	Asymp. Sig. (2-tailed)			.017

**Abbreviations**

L2: Second language; ESP: English for Specific Purposes

**Acknowledgements**

Not applicable

**Submission declaration and verification**

This manuscript has not been published previously, and it is not under consideration for publication elsewhere.

**Authors' contributions**

The corresponding author, LK, was responsible for writing the first draft of the manuscript and collecting the data. SAH was responsible in data analysis and editing the manuscript. EN was responsible for data collection and editing the manuscript. The authors read and approved the final manuscript.

**Funding**

None

**Availability of data and materials**

Raw data is available upon request.

**Declarations****Competing interest**

The authors declare that they have no competing interests.

### Ethics approval and consent to participate

Since in this study only students' essay papers were used without any names on top of the papers but numbers to be able to relate the students' pretest papers to their posttests, ethical approval was not sought. However, at the beginning of the semester, all students in both experimental and control groups were informed that they are part of this study, and they were told that they are free not to participate in this study and they are free of not handing in their essay papers to the researcher. Although the essay papers in the pretest and posttest did not have any names on top of the paper, students were asked at the beginning of the semester to write the following statement on top of their pretest first assignment: "I understand that I will not benefit directly from participating in this research".

### Consent for publication

On behalf of my co-authors and as a corresponding author of this paper, I declare that the journal has the authors' permission to publish the relevant contribution.

### Author details

<sup>1</sup>Department of English Language, School of Paramedical Sciences, Shiraz University of Medical Sciences, Shiraz, Iran.

<sup>2</sup>School of Nursing, Larestan University of Medical Sciences, Lar, Iran.

Received: 25 May 2020 Accepted: 24 May 2021

Published online: 30 June 2021

### References

- Abeyssekera, L., & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: Definition, rationale, and a call for research. *Higher Education Research and Development*, 34(1), 1–14. <https://doi.org/10.1080/07294360.2014.934336>.
- Al-Zahrani, A. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. *British Journal of Educational Technology*, 46(6), 1133–1148. <https://doi.org/10.1111/bjet.12353>.
- AlJaser, A. M. (2017). Effectiveness of Using Flipped Classroom Strategy in Academic Achievement and Self-Efficacy among Education Students of Princess Nourah bint Abdulrahman University. *English Language Teaching*, 10(4), 67–77.
- August, D. (2002). *Transitional programs for English language learners: Contextual factors and effective programming (report no. 58)*. Baltimore: Center for Research on the Educational of Students Placed at Risk Retrieved January 5, 2007, from ERIC database.
- Aziz Faraj, A. k. (2015). Scaffolding EFL students' writing through the writing process approach. *Journal of Education and Practice*, 6(13), 131–142.
- Barroga, E., & Mitoma, H. (2019). Improving scientific writing skills and publishing capacity by developing university-based editing system and writing programs. *Journal of Korean Medical Science*, 34(1), e9. <https://doi.org/10.3346/jkms.2019.34.e9>.
- Basal, A. (2015). The implementation of a flipped classroom in foreign language teaching. *Turkish Online Journal of Education-TOJCE*, 16(4), 28–37.
- Bergmann, J., & Sams, A. (2012). *Flip your classroom reach every student in every class every day*, (pp. 120–190). Washington DC: International Society for Technology in Education.
- Casanave, C. P. (2002). *Writing games: Multicultural case studies of academic literacy practices in higher education*. London: Lawrence Erlbaum Associates.
- Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2018). Effects of the flipped classroom instructional strategy on students' learning outcomes: A meta-analysis. *Educational Technology Research & Development*, 67(4), 1–32. <https://doi.org/10.1007/s11423-018-9633-7>.
- Chwo, S. M. G., Marek, M. W., & Wu, W.-C. V. (2018). Meta-analysis of MALL research and design. *System*, 74, 62–72. <https://doi.org/10.1016/j.system.2018.02.009>.
- Cresswell, A. (2000). Self-monitoring in student writing: Developing learner responsibility. *ELT Journal*, 54(3), 235–244. <https://doi.org/10.1093/elt/54.3.235>.
- Elian, S., & Hamaidi, D. (2018). The effect of using a flipped classroom strategy on the academic achievement of fourth-grade students in Jordan. *IJET*, 13(2), 110–125.
- Eshet, Y. (2004). Digital literacy: A conceptual framework for survival skills in the digital era. *Journal of Educational Multimedia and Hypermedia*, 13(1), 93–106.
- Eshet, Y. (2007). Teaching online: Survival skills for the effective teacher. *Inroads- The SIGCSE Bulletin*, 39(2), 16–20. <https://doi.org/10.1145/1272848.1272862>.
- Evseeva, A., & Solozhenko, A. (2015). Use of flipped classroom teaching in language learning. *Procedia - Social and Behavioral Sciences*, 206, 205–209. <https://doi.org/10.1016/j.sbspro.2015.10.006>.
- Dewi, M. S. N. (2013). Scaffolding Provided by a Teacher in Teaching Writing News Item Text. *Journal of English and Education*, 1(2), 31–38.
- Ferris, D., & Hedgcock, J. (2005). *Teaching ESL composition: Purpose, process, and practice*. Mahwah: Lawrence Erlbaum.
- Ferris, D. R. (2011). *Treatment of error in second language student writing*, (2nd ed., ). Ann Arbor: University of Michigan Press. <https://doi.org/10.3998/mpub.2173290>.
- Gholami Pasand, P., Tahiri, A. (2017). Peer scaffolding in an EFL writing classroom: An investigation of writing accuracy and scaffolding behaviors. *Research in English Language Pedagogy*, 5(2), 147–166.
- Harris, M. (2006). Three steps to teaching abstract and critique writing: Essential stages of scholarly writing. *International Journal of Teaching and Learning in Higher Education*, 17(2), 136–146.
- Hew, K. F., & Lo, C. K. (2018). Flipped classroom improves student learning in health professions education: A meta-analysis. *BMC Medical Education*, 18(1), 1–12. <https://doi.org/10.1186/s12909-018-1144-z>.
- Heyma, A., Bisschop, P., van den Berg, E., Wartenbergh-Cras, F., Kurver, B., Muskens, M., et al. (2015). Effectmeting Innovatiemimpuls onderwijs: Eindrapport. (SEO-rapport No. 2015-28). Retrieved from <https://www.rijksoverheid.nl/documenten/rapporten/2015/06/29/effectmeting-innovatiemimpuls-onderwijs>.
- Hung, H. T. (2015). Flipping the classroom for English language learners to foster active learning. *Computer Assisted Language Learning*, 25(1), 81–96. <https://doi.org/10.1080/09588221.2014.967701>.
- Hyland, F. (2003). Focusing on the form: Student engagement with teacher feedback. *System*, 31(2), 217–230. [https://doi.org/10.1016/S0346-251X\(03\)00021-6](https://doi.org/10.1016/S0346-251X(03)00021-6).

- Jacobs, H. L., Zinkgraf, S. A., Wormuth, D. R., Hartfiel, V. F., & Hughey, J. B. (1981). *Testing ESL composition: A practical approach*. Rowley: Newbury House.
- Kafipour, R., Mahmoudi, E., & Khojasteh, L. (2018). The effect of task-based language teaching on analytic writing in EFL classrooms. *Cogent Education*, 5(1), 1496627. <https://doi.org/10.1080/2331186X.2018.1496627>.
- Khojasteh, L., Shokrpour, N., & Kafipour, R. (2018). Iranian medical students' perception about classroom participation in general English course and its grading criteria. *Pertanika Journal of Social Sciences & Humanities*, 26(1), 375–396.
- Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.
- 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>.
- Lange, V. L. (2002). Instructional scaffolding. Retrieved from <http://condor.admin.ccnycunyu.edu/~group4/Cano/Cano%20Paper.doc>
- Le, V. C., & Nguyen, T. T. M. (2010). Minds working together: Scaffolding academic writing in a mixed-ability EFL class. In B. Baurain, & L. H. Phan (Eds.), *Multilevel and diverse classrooms*, (pp. 149–160). Alexandria: TESOL Inc.
- Lipscomb, A., Swanson, J., & West, A. (2010). *Emerging perspectives on learning, teaching, and technology*. Michael Orey: Global Text Chapter 21. Retrieved from [https://textbookequity.org/Textbooks/Orey\\_Emergin\\_Perspectives\\_Learning.pdf](https://textbookequity.org/Textbooks/Orey_Emergin_Perspectives_Learning.pdf).
- 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(4), 1–22. <https://doi.org/10.1186/s41039-016-0044-2>.
- Murray, D., Koziniec, T., & McGill, T. (2015). *Student perceptions of flipped learning*. Sydney: Proceedings of the 17th Australian Computing Education Conference (ACE 2015).
- Neuendorf, K. A. (2002). *The content analysis guidebook*. Thousand Oaks: Sage.
- Olinghouse, N. G., & Wilson, J. (2013). The relationship between vocabulary and writing quality in three genres. *Reading and Writing: An Interdisciplinary Journal*, 26(1), 45–65. <https://doi.org/10.1007/s11145-012-9392-5>.
- Olson, S., & Matuchniak (2015). *Helping English learners to write: Meeting common core standards, grades 6-12*. New York: Teachers College Press.
- Richards, J. C., & Renandya, W. A. (2008). *Methodology in language teaching: An anthology of current practice*. Cambridge: Cambridge University.
- Rose, D. (2002). *Using scaffolded instruction to optimize learning*. Canada: Koori Centre.
- Saye, J.W., & Brush, T. (2002). Scaffolding critical reasoning about history and social issues in multimedia-supported learning environments. *ETR&D* 50, 77–96. <https://doi.org/10.1007/BF02505026>
- Schmidt, H. G., Wagener, S. L., Smeets, G. A. C. M., Keemink, L. M., & Van Der Molen, H. T. (2015). On the use and misuse of lectures in higher education. *Health Professions Education*, 1(1), 12–18. <https://doi.org/10.1016/j.hpe.2015.11.010>.
- Sun, F. (2014). The Application of Schema Theory in Teaching College English Writing. *Theory and Practice in Language Studies*, 4(7), 1476.
- Van den Bergh, L., Ros, A., & Beijjaard, D. (2014). Improving teacher feedback during active learning: Effects of a professional development program. *American Educational Research Journal*, 51(4), 772–809. <https://doi.org/10.3102/0002831214531322>.
- Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem-solving. *Child Psychology & Psychiatry & Allied Disciplines*, 17(2), 89–100. <https://doi.org/10.1111/j.1469-7610.1976.tb00381.x>.
- Yang, J., Yin, C. X., & Wang, W. (2018). Flipping the classroom in teaching Chinese as a foreign language. *Language Learning & Technology*, 22(1), 16–26.
- Zheng, M., Chu, C., Wu, Y., & Gou, W. (2018). The mapping of on-line learning to the flipped classroom: Small private online course. *Sustainability*, 10, 1–14.

## Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Submit your manuscript to a SpringerOpen<sup>®</sup> journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

---

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)

---