Electronic Flipped Classrooms as a Solution to Educational Problems Caused by COVID 19: A Case Study of a Research Course in Iran Higher Education

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Abstract: A review of the related literature shows that flipped learning has greatly affected the students' academic progress. However, despite a large number of studies on different forms of electronic learning, electronic flipped classrooms and traditional electronic(virtual) learning have not been compared to date. This study was an attempt to investigate the impact of traditional electronic, text flipped, and video flipped learning on improving the graduate students' theory and practical knowledge of research methodology. To meet the goal, the researchers employed a quasi-experimental research method, which is quantitative. The researcher selected three intact classes consisting of 48 postgraduate students majoring in social sciences and communication sciences and exposed each class to one form of electronic learning. The findings showed that flipped classrooms were more effective than traditional electronic learning, and text flipped learning was more effective than video flipped classes. The findings can be used by universities as well as university teachers to use electronic flipped classes as an alternative form of electronic learning It can be concluded that the universities need to encourage flipped classrooms in graduate and postgraduate courses as far as the universities can offer face-to-face classes.

Keywords: COVID 19, Electronic learning, Flipped learning, Flipped classrooms

1. Introduction

Universities and colleges are places where many students study and live near each other. There are also cultural hubs where students, teachers, and staff gather together from different nations around the world. Very recently, the foundations of this ecosystem have been significantly influenced by the rapid spread of the coronavirus (COVID-19) outbreak. Therefore, a kind of uncertainty was created in the higher education system of most countries affected by COVID-19. Over the last months, education officials felt obliged to cancel classes and close the doors to campuses across all cities in Iran as well as across the world in response to the growing coronavirus outbreak. Moreover, the higher education ministry of Iran has switched classes to electronic learning, and students studying at almost all universities in Iran and elsewhere were asked and indeed forced to return home to complete their studies. The researchers of this study, while teaching their students, felt that virtual flipped classrooms might turn out to be more effective than traditional virtual classes, which are mostly teacher-oriented.

Since a couple of years ago, there has been a plethora of research into active learning (Al-Ammary, 2015; Arnold-Garza, 2014; Gündüz and Akkoyunlu, 2019). The most dominantly used model of lecturing at universities is still a model of "show and tell, with students as passive recipients of information" (Vliet, Winnips, and Brouwer., 2015, p. 1). Gündüz and Akkoyunlu (2019) stated that technological changes in the 21st century have created new demand for learning settings. The 21st-century features such as notebook computers, tablets, and mobile phones are part of our daily lives and have become more ubiquitous. Recently, flipped-classroom (also called flipped-lecture or flipped class) pedagogy has become very popular. FC as defined by Gündüz and Akkoyunlu (2019) is an approach that blends face-to-face interaction in the classroom with independent study outside of it, often through watching prepared video content.

Flipped learning models and the impact of each model on the students' academic uptake have been studied to a great extent (Chen, et al., 2018; Chen, Chao, and Hungl, 2018; Chen, et al, 2017; Hao, 2016; Seery, 2015a). Similarly, many flipped learning models have been developed, and currently, databases and theoretical as well as experimental studies on their pedagogical values still continue (Al-Ammary, 2015; Arnold-Garza, 2014; Bergmannand Sams, 2014; Betihavas, et al., 2016; Davies, et al, 2013; Halili and Zainuddin, 2015; Hassan, 2015;

Hoffman, 2014; Tan et al, 2017). A number of systematic review papers have been published topics on the use of flipped learning in higher education. For example, Tan et al. (2017) and Betihavas et al. (2016) systematically reviewed the papers on the role of flipped classrooms in nursing education. Similarly, Chen, Lui, et al. (2017) reviewed the published papers on the use of flipped classrooms in medical education. Moreover, in the context of engineering education, another review was undertaken by Karabulut-Ilgu, Jaramillo Cherrez., and Jahren (2018). Despite these reviews and the empirical studies, there is a lack of studies that investigates the effectiveness of different types of flipped classrooms (text, papers and book chapters), video, and traditional online learning. During the Pandemic, electronic learning has become an important focus of both educational policy makers and instructors in almost all countries and flipped classroom has been emphasized by teachers and educational decision-makers (Giannakos et al. 2018), it seems necessary to address this research gap in higher education context in Iran. Therefore, the researchers tried to investigate the impact of electronic flipped classrooms as an alternative to traditional face-to-face classes at Allameh Tabataba'i University in Tehran, Iran.

1.1 Aims and Research Questions

This paper aimed at investigating the impact of flipped learning on graduate students' knowledge of theories and practice of research methodology. The researchers tried to investigate whether electronic flipped learning and electronic non-flipped learning have the same impact on improving the students' knowledge of research methods (theories and practice). The study also tries to investigate whether video and text electronic flipped classrooms have the same impact on improving the students' knowledge of research methodology. Finally, it attempts to see whether flipped learning has the same impact on the students' performance in the theories and practice sections of the research methodology test. More specifically, the following research questions were raised:

- Does the teachers' use of electronic flipped classrooms affect the graduate students' knowledge of research methodology?
- Does the teachers' use of electronic flipped classrooms affect the graduate students' practice of research methodology?
- Do two types of electronic flipped classrooms, video flipped and text flipped, have the same effect on the students' performance in the knowledge and practice section of the research methodology?

2. Review of the Literature

2.1 Theoretical Background

Flipped learning is deeply rooted in several learning theories. The first underlying theory of flipped classroom is the revised Bloom's taxonomy. As Eppard and Rochdi (2017) have argued, the main assumption of the revised version of Bloom's Taxonomy which is relevant to flipped classroom is that "the transmission of information, which is the basis for learning, is obtained independently and outside of class; while the assimilation of information, which requires greater critical reasoning occurs during class under the guidance of an instructor or mentor" (p.35). the second underlying theory of flipped classrooms is deeply rooted in constructivism. Vygotsky (1978) viewed learning as a process that occurs when the others, who are more competent in the skills which are to be learned, help the learners. Vygotsky also believes that learning is optimized by collaboration within the learner's Zone of Proximal Development (ZPD). Vygotsky (1978) defines ZDP as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through solving problems under adult guidance, or in collaboration with more capable peers"(p.68). In other words, learning successfully take place when students work either with a peer or a more skilled adult/teacher to solve problems that are just beyond their actual abilities. Hence, when the students are using the FC techniques, they are assigned problem-solving tasks they learned through watching the video or reading the texts outside of the classroom. Students either work in groups or in groups under the supervision of the teachers to solve the problems.

2.2 Definitions of Flipped Classroom (FC)

Although the use of flipped classrooms in higher education has turned out to positively contribute to the students' academic achievement, there are few evidence-based research studies that indicate that flipped classrooms might not always turn out to be effective because of the associated challenges with students' familiarity with the technology needed for practicing flipped learning., A small but growing interest in undertaking studies on flipped learning environments in university classrooms has been reported (Brewer and Movahedazarhouligh, 2016; Fraga and Harmon, 2015; Lee, et al, 2016; Love, et al, 2014; Vliet, et al, 2015). For

example, Filiz and Benzet (2018) suggested: that "the learner-centered approach forgoes unnecessary teacher-talk time during class by scaffolding learning from pre-class assignments, and expanding or deepening learning in class" (p.72). This instructional activity through which technology is used to reverse the traditional role of classroom time is referred to as the flipped or inverted classroom (Warden, 2016). Similarly, Fraga and Harmon (2015) stated that teachers are taking advantage of "flipped classroom" models. They highlighted that in the FC model, what generally occurs in the classrooms, such as demonstrations and lectures, occurs at home or out of class. The main assumption underlying the use of FC is to "allow more efficient and effective use of the instructor's time during class to provide the necessary scaffolding, and guidance students need when engaged in applying newly learned information" (Fraga, et al, 2015, p. 18). These classes are generally reported to have resulted in significant effects in terms of learners' achievement, satisfaction, and participation (Kim, 2014; Kim, Jeon, and Choi, 2014; Kim and Kim, 2014; Mehring, 2016).

2.3 Empirical Studies on Flipped Learning

To gain a comprehensive understanding of the flipped classroom in a university context, Al-Samarraie, Shamsuddin, and Alzahrani (2019) conducted a literature review study. They guided the study by interpreting the previous research findings based on the domain of utilization, opportunities, challenges, and extensions to the conventional flipped classroom model. The findings revealed that the use of flipped classrooms in different disciplines is mainly advocated to promote students' engagement, attitude, metacognition, understanding, performance, and achievement, as well as other learning outcomes. In a review article, Seery (2015b) surveyed the related studies with regard to the rationale for using the flipped classrooms and, how educators implemented and evaluated the flipped classroom approach. The findings revealed that the flipped classrooms are highly popular with teachers and students and they adopt them to increase the students' engagement, flipped classrooms are used to develop an active learning environment and allow time for developing a deeper understanding of the field

Love, et al (2014) compared the conventional instructional practices with the flipped classroom teaching model in an applied linear algebra course. They reported that students who received instruction through the flipped classroom model outperformed the students in the conventional instruction model. They also found that students positively reacted to the flipped learning model. The findings of previous studies (e.g., Amresh, Carberry, and Femiani ,2013; Cabı, 2018; Casadonte , 2018; Chen, et al., 2018; Velegol, Zappe, and Mahoney, . 2015) revealed that students' performance scores improved even when students sometimes found the flipped classroom intimidating and overwhelming. This might somehow be associated with students' positive perceptions of the format of flipped classrooms which allowed them to read more material and perform better in quizzes and exams (Chien and Hsieh 2018). Therefore, it can be inferred that the structure of the teaching syllabus and materials for teaching engineering courses can greatly benefit from the flipped classroom format since it can help students take a very active approach in doing the group activities, negotiating and discussing materials, and researching the used online teaching resources to justify the answers and to solve the problems.

It has also been claimed that a flipped classroom can be used to develop students' motivation, problem-solving skills, and engagement (Panuwatwanich 2017). This led to a common perception that the majority of the participants in the previous studies view flipped learning as a valuable addition to the traditional teaching methods (Mitchell, 2017).

Similarly, Vliet, et al (2015) investigated the effects of flipped classes on motivation and learning strategies in higher education. They employed a controlled, pre-test, and post-test approach. They collected the data by administering a validated Motivated Strategies for Learning Questionnaire (MSLQ). The results showed that flipped-class pedagogy enhanced the MSLQ components of task value, critical thinking, and peer learning. However, the effects of flipped classes did not exist. They suggested that the repeated use of flipped classes in a curriculum can make effects on metacognition and collaborative-learning strategies sustainable.

Very recently, Gündüz and Akkoyunlu(2019) determined the challenges and benefits of the flipped classroom in higher education. They employed a questionnaire consisting of open-ended questions to delve into the participants' views of flipped learning. The results of their study indicated that through implementing flipped learning students can have a chance to experience greater instructional flexibility during both online and in-class sessions. Although the participants of their study argued that they felt more responsible for their own learning, some of them were dissatisfied with poor Internet access outside of the classroom and expressed disappointment with the lack of immediate feedback while watching videos and listening to podcasts.

Sung (2015) investigated the effect of flipped classrooms containing twelve university students attending an elective course. Before the instruction, the learners previewed lesson materials such as readings and videos and were involved in various online activities on a Learning Management System (LMS) platform. Then, they completed collaborative class activities such as sharing their thoughts on paper, discussing questions regarding weekly online readings and implementing the final project of planning an assessment proposal. The outcomes of the analysis of both informal and formal course assessments and student work indicated that they were positive with flipped instruction despite early integration problems. The results also indicated that FCI is a good choice for modification, at least in existing English language teaching.

Adedoja (2016) examined Nigerian pre-service teachers' attitudes toward flipped instruction and the challenges they faced while teaching. The study used both conventional instruction and flipped instruction by developing the questionnaire and Focus Group Discussion. The results revealed that the attitude of pre-service teachers was completely positive regarding flipped instruction. Nouri (2016) conducted a study on the Swedish learners' attitude toward flipped learning in research methods by administrating the questionnaire. The results showed that the sum of the participants stated a positive attitude towards flipped classrooms as a result of improved motivation, engagement, and more effective learning.

As the findings of the related studies suggest that the FC model can be an effective instructional approach, the researchers feel that it might prove to be useful in higher education, while the universities are not offering face-to-face educational services to the students. Most particularly, the researchers found that teacher-oriented electronic classes might be different from flipped classes as an interactive learning approach. Although flipped learning has attracted the attention of researchers in higher education, the number of studies on the use of flipped learning in graduate courses is scanty.

3.   Methodology

The researchers employed a quasi-experimental research method to investigate the impact of flipped learning on improving graduate students' knowledge and practice of research methodology. As research methodology is an obligatory course for MA students and the content of the course does not vary across all Masters of Arts (MA) majors, the researcher selected it as the variable of the study. Moreover, all the participants had passed basic research methodology courses in the undergraduate curriculum as an obligatory course. Three weeks after the spread of COVID 19 in Iran, the researchers selected three intact classes at Allameh Tabataba'i University (intact classes A, and C), and Khazar Higher Education institute (intact class B). The intact classes were selected among the faculties of social sciences and communication sciences and humanities. At the outset of the study, a research test consisting of open-ended questions and multiple-choice items was developed by the researcher and administered to 75 Masters of Arts (MA) students, to check the homogeneity of the intact classes. To make sure that the students in three different classes are homogenous, the students who scored +1 Standard deviation above and below the mean were excluded from the final analysis, but not excluded from the intact classes. The participants' recruited for the final analysis were 48 (15 in Class A, 16 in Class B, and 17 in class C). All participants were adults and their age range varied between 24 and below 35. All participants were Iranian. 62.5 % (n=30) of the participants were male and 27.5% (n=13) of them were female. The three classes were in communication with each other. They were all taking advanced research courses at the mentioned universities. The researchers negotiated the syllabus and selected the same content areas for the three classes.

Intact classes A, B, and C were assigned to Electronic Flipped 1(text), Electronic-Flipped 2, and non-flipped electronic learning conditions. Teaching processes were explained to each intact group and they all agreed with the instructor's instructional plan. In the three intact groups, the researcher used the BigBlueButton software as an online learning system (See the screen in Appendix). BigBlueButton enables the teachers to share their audio, slides, chat, video, and desktop with students. Built-in polling makes it easy to engage students, and recording the lectures means that the teachers can make them available for later review. One of the experimental intact classes received flipped learning intervention through watching videos, one group received articles and book chapters, and one group received only electronic teaching. In the electronic non-flipped classroom, the teacher used Big-Blue-Button, through which he delivered the contents of the syllabus to the students online. The class was mostly teacher-oriented, but the students had the chance to speak and ask questions if needed. However, in the video flipped classroom, the researcher audio-recorded each session and sent it to the students as a video file through the Big-Blue-Button, four days before the class schedule. The students were required to download the file at home, watch it, and do the assignments at home. In the following session, the teacher and the students joined an online classroom and discussed the main topics of the video file through interactive activities, i.e., the teacher just asked questions and managed the interactions among the students and in some cases, he added to

the students' comments. However, in the text flipped classrooms (papers and book chapters), the teacher added book chapters and papers to the Big-Blue-Button space. The students were encouraged to download the assigned files and read them as much as they needed and to take notes. In the following session, like the video flipped learning, teachers and students negotiated and discussed the syllabus. The students were encouraged to comment on the topics raised by the teachers and the students. On the 14th session, the researchers developed the research methodology post-test and administered it to the selected intact classes. The participants in each class were coded numerically, and their scores on the knowledge and practice sections of the research methodology posttest were reported and submitted to appropriate data analysis techniques. The test was administered online to the Three Intact Classes

4. Data Collection Procedure

The researchers developed two research methodology tests to collect the required data: pre-test and post-test. Each test is described in detail, as follows:

4.1 Pretest

The pre-test consisted of 20 multiple choice items (each correct answer=1 point) and 10 open-ended questions (each item=1 point). The questions evoked the participants' knowledge about sampling, research designs, hypotheses, research paradigms, data collection strategies, research ethics, and different parts of a paper. The reliability of the test was estimated through Kurder and Richardson -21 (KR-21). The test enjoyed an acceptable level of reliability (0.84).

4.2 Posttest

The posttest consisted of two sections: knowledge and practice. The knowledge section consisted of 30 multiple-choice items and 10 open-ended questions. However, the practice section consisted of different tasks such as developing research questions and hypothesis, evaluating a paper in terms of method, discussion, introduction, and conclusions, criticizing the review of literature section, writing in-text citations, writing a sample abstract and introduction, and writing a review paper. This section was evaluated holistically by two researchers. The mean of the scores given by two researchers was reported as each student's final score on the posttest research practice section. The reliability of the research knowledge test was estimating through KR-21, while the reliability of the practice section was estimated through inter-rater reliability. Both sections enjoyed an acceptable level of reliability (0.87 and 0.90).

5. Ethical Permission

In order to follow the research ethics, the researchers negotiated types of flipped classrooms with the students in each class. They explained the purpose of the study to all participants. The participants were asked to sign the informed consent form. The participants were assured that the same content of research methodology is taught to all groups. The teachers also assured the participants that they would give the chance to students to have access to some recorded files containing the research methodology syllabus after the post-test if they did not learn the content of the course well.

6. Data Analysis

The researchers analyzed the data in different ways. KR-21 was employed for analyzing the reliability of the placement test and the theory section of the achievement test. Pearson correlation was used to estimate the correlation coefficient between two sets of scores as the index of inter-rater reliability of the groups' scores on the practice section of the achievement test. Also, the researchers employed one-way ANOVA to answer research questions 1 and 2. Moreover, the researchers calculated the effect sizes for different types of flipped classrooms (Video vs., Text) to answer the third research question.

7. Results

In this section, the main findings are presented. At first, the pre-test findings are presented. Then, the findings of the three research questions are presented sequentially. First, the participants' scores on the pre-test were submitted to a one-way ANOVA. Results are presented in Table 1.

Table 1: ANOVA for comparing the groups' scores on the pre-test

Groups	Mean	SD	df	Mean Square		F	P
				Between groups	Within groups		
Non-Flipped	9.14	1.4	2/46	5.91	2.13	2.77	0.09
Flipped 1(research)	9.50	1.5					
Flipped 2 (Video)	9.19	1.3					

The 15 participants in the control group had an average of 9.14 (SD = 1.4); the 16 participants in the Flipped Class 1 (paper and books) had an average of 9.4 (SD = 1.5), and the 17 participants in the Flipped Class 2 (Video) had a mean of 9.9 (SD = 1.3). The difference between the groups, therefore, was not significant, F (2, 46) = 2.77, p=.09. That is, the three intact classes were homogenous in terms of research knowledge.

7.1 Results for the Research Question 1

The first research question aimed at investigating whether or not teachers' use of electronic flipped classroom affect the graduate students' knowledge of research methodology. In order to answer this question, the three groups' scores on research methodology achievement test (theory section), after checking the assumptions of ANOVA test including homogeneity of variances and normal distributions were submitted to a one-way ANOVA test. Results are presented in Table 2.

Table 2: The groups' scores on the knowledge section of research methodology test

Groups	Mean	Sd	df	Mean Square		F	P
				Between groups	Within groups		
Non-flipped	23	1.6	2/45	412	2.44	168.5	0.001
Flipped 1(Video)	28.6	1.7					
Flipped 2 (text)	33.2	1.6					

The 15 participants in the traditional virtual class had an average of 23 (SD = 1.6); the 16 participants in the Flipped Class 1 (video) had an average of 28.6 (SD = 1.7), and the 17 participants in the Flipped Class 2 (papers and books) had a mean of 33.2 (SD = 1.6). The difference between the groups, therefore, was significant, F (2, 45) = 168.5, p=.001. That is, the three intact classes did not have the same performance on research knowledge section. Moreover, the results of the post-hoc test (Bonferroni) showed that the difference between the students in flipped2 classroom (papers and books) outperformed the students in flipped 1(video) class, and the students in flipped1 outperformed the students in the traditional virtual classroom. That is, the difference between the mean scores of the students in the traditional virtual classroom and flipped 1 was statistically significant favoring the fliped1 classroom (p=0.001). Also, the difference between the mean scores of the students in flipped1 classroom and flipped2 classroom was statistically significant favoring the fliped2 classroom (p=0.001). Results can be seen in Table 3.

Table 3: Multiple comparisons between the three intact classes' scores on the knowledge section of the research test (Bonferroni test)

(I)	(J) groups	Mean Difference (I-J)	Std. Error	Sig.
Non-flipped	Video Flipped	-5.62	.56	.000
	Text Flipped	-10.17	.55	.000
Text flipped	Video flipped	4.55147*	.54	.000

7.2 Research Question 2

The second research question addressed the impact of different flipped classrooms on the graduate students' practice of research knowledge. To answer this question, the three intact groups' scores on the practice section of the research test were submitted to a one-way ANOVA test. Results are presented in Table 4.

Table 4: The groups' scores on the practice section of the research methodology test

Groups	mean	Sd	df	Mean Square		F	P
				Between groups	Within groups		
Non-flipped	20.6	2.19	2/45	1182.2	6.01	196.1	0.001

Groups	mean	Sd	df	Mean Square		F	P
				Between groups	Within groups		
Flipped 1(video)	33.4	1.4					
Flipped 2 (text)	37.7	1.15					

The 15 participants in the non-flipped virtual class had an average of 20.6 (SD = 2.19); the 16 participants in the Flipped Class 1 (video) had an average of 33.4 (SD = 1.4), and the 17 participants in the Flipped Class 2 (papers and books) had a mean of 37.7 (SD = 1.15). The difference between the groups, therefore, was significant, $F_{(2, 45)}$ = 1182.2, p=.001. That is, the three intact classes did not have the same performance on the practice section of the research test. Moreover, the results of the post-hoc test (Bonferroni) showed that the difference between the students in flipped2 classroom (papers and books) outperformed the students in flipped 1(video) class, and the students in flipped1 outperformed the students in the traditional virtual classroom. That is, the difference between the mean scores of the students in the traditional virtual classroom and flipped 1 was statistically significant favoring the flipped1 classroom (p=0.001). Also, the difference between the mean scores of the students in flipped1 classroom and flipped2 classroom was statistically significant favoring the fliped2 classroom (p=0.001). Results can be seen in Table 5.

Table 5: Multiple comparisons between the three intact classes' scores on the practice section of the research test (Bonferroni test)

(I)	(J) groups	Mean Difference (I-J)	Std. Error	Sig.
Non-flipped	Video-flipped	-10.63	.88	.001
Text Flip	Text flipped	-17.19	.86	.001
	Video-flipped	6.26	.85	.001

7.3   Research Question 3

The third research question aimed at investigating whether different types of flipped electronic classrooms had the same impact on the students' performance on the research methodology test. The effect sizes for each type of flipped classroom were estimated. The effect size of different types of flipped classrooms in the knowledge section of the research methodology was 2.7, while the effect size of different types of flipped classrooms in the practice section was 3.28. As the effect size of 1.4 is large (Cohen, et al, 2018), it can be argued that both video and text flipped classrooms have great effects on the students' performance in the knowledge and practice sections of the research methodology. However, the experimental effect of flipped classrooms on the practice section is larger than that of the knowledge section of the research methodology suggesting that flipped classrooms are more effective for the students' practice of research methodology.

8.   Discussion

The main objective of the present study was to investigate whether the three types of electronic learning (traditional electronic, video flipped, and text flipped) have the same statistically significant impact on improving the graduate students' theory(knowledge) and practice of research methodology. The researcher, having estimated the initial homogeneity of the three intact groups, used three types of electronic learning modes to teach research methodology to the graduate students. Results showed that the students in both flipped electronic classrooms outperformed the students in the traditional electronic classroom, and the difference was statistically significant (p=0.001). That is, virtual flipped classes were found to be more effective than non-flipped virtual classes, in both the students' theory/knowledge and practice research methodology.

This finding is consistent with the results of some of the reviewed related studies (Baranovic, 2013; Grimsley ,2013; Gündüz and Buket Akkoyunlu, 2019). In line with Gündüz et. Al. (2019), it can be argued that the use of flipped learning allows students to be more active in the teaching and learning process, and it gives them more time for active student participation in the classroom. Moreover, classroom time is used more creatively and effectively. Another justification for this finding is that in flipped classrooms, students have a greater chance to experience greater flexibility during both in-class and online sessions. Another reason for the effectiveness of virtual flipped classrooms is, as Lage *et al.* (2000) believed, inverted classrooms engage students with different learning styles. It can also be argued that because the flipped-class approach helps students to regulate and direct their learning, they are more effective than non-flipped classrooms. In line with Mason et al. (2013), it can be argued that in the flipped classroom, the instructors have opportunities to cover more material and

improve student participation in the classroom activities. Moreover, flipped classrooms are more effective than non-flipped ones because the students have the chance to pause or re-watch the video files and re-read the text files as many times as they like, while in the traditional virtual classes the students do not have such opportunities.

The results also showed that the students in the text flipped classroom outperformed the students in the video flipped classroom and the difference between the mean scores of both flipped classes on both knowledge and practice sections of the research methodology test were statistically significant, favoring the text flipped classes. That is, the students' mean scores of the text flipped classroom on both knowledge and practice sections of the research methodology achievement test exceeded the mean scores of the video flipped classroom. This finding is not consistent with some of the researchers who argued that students are able to take better notes by re-watching and pausing the videos, which them to understand the content (Awidia and Paynterba, 2019; Siegle 2014). However, it is consistent with the findings of Gündüz, et al (2019) who argued that some of their participants expressed disappointment with the "lack of immediate feedback while watching videos and with their poor Internet accessibility outside of the classroom" (p.11). The main reason for the inconsistency between the findings of this study and the reviewed studies is that: a) it took time for each student to download the video files due to the low speed of the internet in Iran and their listening related problems and issues such as the teacher's tone, accent, and speech speed rate, b) while reading the book chapters and papers, students have great opportunities to reflect on each unknown academic term and surf the net for having more information about the assigned topics.

With regard to the third research question, it was found that the experimental effects of both types of flipped classrooms were large. It was also found that the effect size of flipped classrooms for the practice section of the research methodology (3.28) exceeded the reported effect size (2.7) for the knowledge section of the research methodology. Therefore, it can be argued that both text ad video flipped classrooms enhanced the participants' scores on the practice section of the research methodology more significantly than the theory section. As this finding is quite new in this realm of study, there is no research in the review section to back up the finding. However, it could be inferred that in the flipped classes, the students have the chance to rehearse and discuss the materials with the teachers and their classmates. More particularly, in the text flipped classes, the students are exposed to sample research papers and book chapters. Therefore, they actually practice the theories of the research, and they get familiar with the genre of the research papers.

9. Conclusions

In line with the findings of the study, it could be concluded that, as the Coronavirus closed all face-to-face classes at universities all over the world, a radical shift from traditional learning to electronic learning is unavoidable. Among the flipped classrooms, because of the students' likely problems such as slow speed of internet, text flipped classes are more strongly recommended to faculties and educational administrators at both local and international universities. It can also be concluded that for practical courses such as research methodology, as a very needed course for graduate and postgraduate students, academic writing courses, etc., the use of text flipped classes is much more advantageous than the other types of electronic learning and video/audio flipped classes. As the context of the study, the students' and teachers' electronic learning literacy, and the nature of academic fields of the study might play a role as mediator variables, the other researchers are recommended to replicate the study using these variables. In this small-scale study, results suggested that text-flipped classes have strong potential to foster student learning. Therefore, universities can employ the findings and provide the students and teachers with required online learning platforms. As graduate students are active learners and they are required to write papers and projects for the courses they take, text flipped classrooms are strongly suggested to university instructors to help students acquire the needed skills to practice the theories learned in each classroom.

Despite the merits of this study, the researchers' faced some limitations such as lack of access to a large number of participants and the impossibility to deeply delve into the participants' perceptions about different types of electronic learning, Therefore, it is clear that further research is needed to explore this finding further at different scales, across different subject areas, and in different learning contexts through both qualitative and mixed-methods research designs.

Abbreviations

EFL= English as a Foreign Language

ESL= English as a Second Language

FC= flipped classroom

FCI= flipped classroom instruction

KR-21= Kurder and Richardson -21

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