The Effect of Teaching Writing Based on Flipped Classroom Model on Metacognitive Writing Awareness and Writing Achievements of Middle-School Students *

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The Effect of Teaching Writing Based on Flipped Classroom Model on Metacognitive Writing Awareness and Writing Achievements of Middle-School Students *

Hasan Basri Kansızoğlu [1], Özlem Bayrak Cömert [2]

Abstract

The purpose of this study was to determine the effect of Flipped Classroom (FC) model on metacognitive writing awareness and writing achievement. The pre-/post-test control group research model was used in this study. The research was carried out in a middle-school which is in Black Sea region of Turkey and totally 55 (28 experimental, 27 control) students participated in the study. Also, this study carried out within the scope of the Turkish course. The experimental group was taught based on the FC model for eight-weeks, on the other hand the control group was taught the story writing in face-to-face model. The data were collected using the Narrative Text Analytic Rubric (NTAR) and the Metacognitive Writing Awareness Scale (MWAS) which was developed by the researcher and analyzed with the IBM SPSS Statistics 22.0 program. The results of the study showed that the metacognitive writing awareness and story writing achievement of the teaching group based on the FC model were statistically higher than the students in the traditional face-to-face teaching group.

Introduction

Writing has traditionally been described as "the expression of emotions, thoughts, desires and events in our minds with various symbols in accordance with certain rules" (Güneş, 2013). However, today it is accepted that writing is not only an activity of symbolization and recording but also a well-rounded skill that includes making connections, building meaning and construction (Graham, 2006; Güneş, 2020; Harris, Santangelo, & Graham, 2010; Karadağ, 2016). In this sense, rather than a linear activity writing is perceived as a recursive, strategic and multidimensional process where ideas are planned, transformed into a text and revised (Harris et al., 2010). In this procedure, the elements of thinking, participation, reflection, analysis, synthesis, evaluation and solving problems are emphasized (Sharples, 1999).

Writing is used for various purposes such as learn new things, persuade others, record information, express feelings and explore the meanings of events and situations (Graham, 2006). Being

necessary for thinking, learning, and communicating, this skill has critical importance in ensuring the personal / social development and economic success of nations (Dunsmuir & Clifford, 2003). Despite its importance, the area of writing is neglected today, and current practices and resources are inadequate in developing skills specific to this area (National Commission on Writing [NCOW], 2003). In a study conducted by Graham (2019) based on various research of writing, it is reported that the main indicators of insufficient writing education are the limited time allocated to education, rarely conducted writing research, and lack of different education practices. Other indicators are that digital tools are not used much, cooperation opportunities are not increased, formative evaluations are not made frequently, motivation is often neglected, and class resources are insufficient. These indicators are also valid for the current state of writing education. Indeed, studies in Turkey show that limitations such as content, environment and time in writing education given in schools are not eliminated (Baştuğ & Demirgüneş, 2016), and traditional methods are preferred in the studies (Tok & Ünlü, 2014) evaluation, feedback and editing processes are not sufficiently covered (Karatay, 2011) and writing activities are mostly replaced by homework (Gündüz & Şimşek, 2011) instead of classroom work under the supervision of the teacher. Studies conducted outside Turkey prove that this problem is too large to be limited to a geography, student group or curriculum. Indeed, the research of Applebee and Langer (2011) revealed that only %7,7 of class time is allocated for writing in the U.S secondary schools. Again, the data of National Assessment of Educational Process has revealed that only %25 of the fourth, eight and twelfth grade students can be classified as proficient writers (Persky, Daane, & Jin, 2003, as cited in Harris, Graham, Brindle, & Sandmel, 2009). Additionally, the facts that students don't use writing strategies much, educators aren't well-prepared for the teaching of writing (Graham, Capizzi, Harris, Hebert, & Morphy, 2013) and they also don't use formative evaluation activities for all students regularly (Graham et al., 2016) are shown to be other problems.

Writing is a complex and challenging task that requires a significant amount of training time to master (Graham, 2018). To get the highest level of efficiency from the education for this task area, student-centered practices, and individualized training should be preferred (Göçer, 2010; Yıldız, Okur, Arı, & Yılmaz, 2008). However, crowded classes, intensive curricula, and limited time spent in school make it difficult to provide individualized training (Boyraz, 2014). As the number of students increases, it is not possible to design and perform a writing education to meet the needs of all students (NCOW, 2003). Therefore, writing education in schools is carried out with the focus of providing information in limited learning environments (Karadüz, 2014). Such a traditional education, in which guided practices are neglected, planning, research, and analysis processes are not sufficiently covered and less learning support is provided, does not contribute to the development of students' writing skills (Anders, 2016).

Insufficiencies in traditional teaching practices affect students' writing attitudes and skills adversely (Harris et al., 2009). Negative attitude towards writing limits the participation of students in writing, the effort they spend on writing and the resources they will use (Graham, 2018). In this regard, systematic review and meta-analysis studies in the literature contain practical information on what steps should be taken to eliminate such negatives in writing education (Graham & Harris, 2009; Graham, Harris, & Chambers, 2016; Graham, Harris, & Santangelo, 2015; Troia, 2014). The common elements in these studies are; increasing the knowledge of students about writing, providing them with the time and feedback opportunities to write; teaching planning, review and editing strategies of writing, creating a supportive writing environment, and adopting a process-based writing approach. Many other studies emphasize that metacognitive skills training should be included in the practices for the development of writing skills (Hacker, Keener, & Kircher, 2009; Kaya & Ateş, 2016; Sitko, 1998). The Flipped Classroom Model (FC) developed as an alternative to traditional face-to-face education, is believed to involve stages that will allow the development of these elements.

The Flipped Classroom Model

The FC was defined in the Horizon Report of 2012 as a promising method that can open up new approaches to education and it has been increasing its popularity with the advance of internet technologies (Johnson, Adams, & Cummins, 2012). In this method, the first contact with new concepts is moved from group learning to individual learning; the group area is transformed into a dynamic and interactive learning environment where educators guide students, students apply concepts, and actively participate in the subject (Talbert, 2017, p. 20). The method includes three basic phases: pre-class, in-class, and reflection/evaluation (Bergmann & Sams, 2012; Jensen, Kummer, & Godoy, 2015; McLaughlin, White, Khanova, & Yuriev, 2016). In the pre-class stage, content/materials are presented that will help students to think critically and to understand the content in depth (McLaughlin et al., 2016). The aim is to meet the learning needs of the individual in the best way (Bergmann & Sams, 2012). In the classroom stage, students are given the opportunities to demonstrate their competencies, and to make practices and evaluations, while in the reflection/evaluation stage, the activities of the class and the classroom, the effectiveness of the class and the status of the students in terms of content and key concepts are evaluated by using various strategies (McLaughlin et al., 2016). So, many elements are included in the different stages of this model from the construction of meaning to revealing higher level thinking and also from the cooperative learning to the reflection of what has been learned (Kavanagh, Reidsema, McCredden, & Smith, 2017).

In the traditional education approach, lessons are taught in the classroom, and homework is given to the students to help them understand the learning content better. In the FC model, students get prepared for the lesson by watching the videos related to the course content in the pre-class phase, they can do practical and collaborative studies and get feedback from their peers/teachers at the classroom level rather than theoretical explanations. In the last phase, students can reflect and evaluate their learning. In this way, by flipping the structure of teaching, the limitations of traditional education such as time and environment can be overcome, and students can participate in learning more effectively.

Effect of Flipped Classroom on Writing Achievement

The FC model allows students to actively learn, develop collaboration opportunities, and receive more learning support in their learning processes by better adjusting the teaching time (Bergmann & Sams, 2012). These are the most important reasons for using the model in writing education. Because the FC model gives students more time to practice writing in an interactive and collaborative classroom environment by moving the content out of the classroom (Voss & Kostka, 2019). With this approach, time can be devoted to every step of the writing process (brainstorming, outlining, drafting, review and editing) as well as to teacher guidance in these steps (Buitrago & Diaz, 2018). In addition, active learning is encouraged, allowing students to participate willingly in writing activities in the classroom (Ping, Verezub, Badiozaman, & Chen, 2019). It is easier for peers to give feedback to the writing than traditional model (Zou & Xie, 2019). Students can show their potential better by focusing more on their writing processes rather than grammar (Buitrago & Diaz, 2018).

There are many studies in the literature that conclude that the FC improves the writing achievement (Baranovic, 2013; Leis, Tohei, & Cooke, 2015; Özbilen, 2018; Özdemir, 2017; Pavanelli, 2018; Soltanpour & Valizadeh, 2018). In one of these studies, Özdemir (2017) concludes that the FC model improves the Turkish pre-service teachers' writing skills on narrative and informative texts and contributes to the regulation of content creation and writing processes. In another study conducted with Turkish pre-service teachers, Özbilen (2018) reported that the FC is more effective than the traditional method in increasing the writing achievement. In addition, Pavanelli (2018) shows that the FC model has a significant impact on the academic writing performance of students; students perceive the model as a learning resource that enables interaction and collaboration and is more effective than traditional methods in developing their writing skills. In another study, Soltanpour and Valizadeh (2018) reveal that the FC improved students' argumentative text writing skills more than traditional methods and

that the significant difference between the achievements of the students in FC and traditional class did not change over time. In a workshop conducted with undergraduate students, Baranovic (2013) detects that the FC is effective in writing skills and students could learn writing subjects in a shorter time with this model. In another study, Leis et al. (2015) reported that students who received writing education based on the FC model developed their writing competencies more than those who received traditional writing education and that the number of words used in their compositions tended to increase over time.

In such studies, which report the importing effect of the FC on writing skills, active learning opportunities offered by the model are presented as the most likely cause of the effect in question. Said Ahmed (2016) determines that the FC improves writing skills more than the traditional method does and presents the emphasis of the FC on learner autonomy as an important reason. Özdemir (2017) reported the possible causes of this effect as being able to give more space to practical activities at the time of the lesson, teacher guidance, making the unlimited theoretical repetition, and providing compensation for the missed content. Leis et al. (2015) list the possible reasons for the improvement in students' writing achievement within the scope of the FC as having access to content and feedback related to writing at any time and everywhere. Pavanelli (2018) shows that students have more time to write and reflect on their own work with the FC, interactive activities in the classroom and the development of collaboration are among the reasons for this performance. In another study, Crisafulli (2015) explains this improving effect by the nature of the FC which enables the classroom environment to be designed in such a way that students can learn the elements related to writing in-depth and perform different types of tasks.

The Relationship between Metacognition and Writing

Metacognition is a high-level thinking activity that requires active control over a range of cognitive processes, such as planning how to approach a specific learning task, monitoring understanding, and evaluating progress made to complete a task (Livingston, 1997). This activity area emphasized by the researchers since the 1970s when the theoretical foundations began to be established, it has been explained with many associated concepts such as knowledge (Flavell, 1979) awareness (Schraw, 2001; Schraw & Dennison, 1994; Schraw & Moshman, 1995) skill (Cera, Mancini, & Antonietti, 2013; Veenman, Kok, & Blote, 2005) and strategy (Gourgey, 2001). Even though they refer to different elements, these concepts are a whole and cannot be considered separately (Dunlosky & Metcalfe, 2009). In this regard, the concept of "metacognitive writing awareness" used in the present study involves factors such as knowledge strategy use and regulation along with awareness of writing processes.

The impact of the models that emphasize the cognitive aspect of writing in the emergence of metacognition (Bereiter & Scardamalia, 1987; Hayes & Flower, 1980) and the identification of processes such as planning, goal setting, generating ideas, editing and evaluating in these models provide a close connection between metacognition and writing. In this scope, metacognition is regarded as a vital factor in the development of writing skills (Graham & Harris, 2009; Hacker et al., 2009; Raphael, Englert, & Kirscher, 1989; Taczak & Robertson, 2017). This importance attributed to metacognition is also emphasized in the definitions of writing. In these definitions, writing is defined as "problem-solving task requiring metacognitive control of planning, text production, and review stages" (Hayes, 2012) and "applied metacognition activity" (Hacker et al., 2009). The studies in the literature (Qin & Zang, 2019; Teng, 2019; Wei, Shang, & Briody, 2012) involve findings that support this connection between writing and metacognition. In one of these studies, Teng (2019) reported that metacognitive knowledge and regulation collectively predicted more than 60% of the variance in writing performance. Some studies of systematic review and meta-analysis also reported the positive effect of metacognition on writing outcomes (Bangert-Drowns, Hurley, & Wilkinson, 2004; Graham & Perin, 2007). For this reason, people who do not have sufficient metacognitive skills in writing have difficulties in writing processes; they are also likely to experience significant deficiencies in important strategies such as setting goals,

generating ideas, choosing topics, planning, editing and reviewing the text (Harris et al., 2010, p. 235-236). In this regard, it is believed that the FC will contribute to the metacognitive dimension as well. Because the phases of the FC and the tools used in these phases are suitable for metacognitive training. The videos used especially in the pre-class phase are quite functional in metacognitive development (Moos & Bonde, 2016; Yılmaz & Baydaş, 2017).

The Effect of the FC Model on Metacognitive Processes in Writing

Writing education offered based on the FC contributes to the development of metacognition (Buitrago & Diaz, 2018; Ghufron & Nurdianingsih, 2019; Ping et al., 2019). In the study conducted by Buitrago and Diaz (2018), it was reported that writing based on the FC contributes to students to be more aware of their learning processes, to develop awareness about their strengths and weaknesses, and to achieve learner autonomy. In another research, Ghufron and Nurdianingsih (2019) concluded that the FC is a model that contributes to self-regulated learning associated with metacognition as well as learning autonomy in writing classes. In another study, Ping et al. (2019) revealed that students with low-efficacy benefit from the opportunities of practice, participation, interaction, motivation, and instant feedback provided by FC-based writing, and that they have a higher level of self-efficacy belief after class.

This relationship with metacognition can be explained by the fact that the FC contains pre-class tasks such as reading, watching videos, completing quizzes, or answering questions differently from narrative learning. To be successful in these tasks, students must employ metacognitive skills such as independent learning, time management, and identifying problems that need clarification (Mclean, Attardi, Faden, & Goldszmidt, 2015). In the FC approach, it is important to encourage students to think outside the classroom as well as in the classroom (Kellinger, 2012) and thus to be aware of their own learning processes (Roehl, Reddy, & Shannon, 2013). This awareness of learners about their own learning processes also paves the way for the formation of metacognitive processes (Brame, 2013).

FC is an approach that emphasizes the development of students' self-learning skills and their own learning responsibilities (Bergmann & Sams, 2012). This approach contributes to the development of metacognition through student-centered course design and assigning students with the responsibility to empower them (Shih & Huang, 2018). In this scope, students need to take into account metacognitive strategies, use these strategies and have advanced skills in order to complete the online learning process in pre-class phase (van Alten, Phielix, Janssen, & Kester, 2020; Yılmaz & Baydaş, 2017). Roehling (2018) deemed these skills as a prerequisite for the success of the FC. In their meta-analysis study, Låg and Sæle (2019) showed that the development of self-direction skills among students is one of the factors that can increase the effectiveness of the model.

In the context of the FC, the self-awareness of students about being a learner, and the use of strategy results in a metacognitive development (Shih & Huang, 2018). Besides, the contribution of FC to the development of self-control directly or indirectly affects the development of metacognition. In fact, self-control is regarded among the important elements of metacognition and self-regulated learning (Shih & Huang, 2019; Sun, Wu, & Lee, 2017; Talbert, 2017). Learners, who have more control over their learning; metacognitively, constantly think and evaluate their learning, learning strategies, and their competencies towards the material thanks to the FC model (Kostka & Marshall, 2017). In this respect, Talbert (2017) emphasized the necessity of regular implementation of self-regulated learning behaviors as part of the basic infrastructure of the course, by reporting that the course narration is made before the lesson, but they have control over how they learn from these narrations in the FC model. At this point, the FC is emphasized to be an approach that encourages self-direction, and thus metacognition.

In addition to self-control, the FC's emphasis on peer feedback is also seen as a contributing factor to students' metacognition levels (Shih & Huang, 2019). Indeed, one of the biggest advantages of the FC is that teachers have more opportunities to provide continuous formative feedback (Bauer-Ramazani, Graney, Marshall, & Sabieh, 2016). In addition, the use of the FC helps learners to be aware of the need for external help in the learning process, to identify the people who can provide this help, and select and use the appropriate methods required (Sun et al., 2017). These statements are also closely related to metacognition.

Classroom group works in the FC is another factor that encourages students to use metacognitive strategies. Because students' desire to apply group work without any problems and to actively maintain group dynamics is a factor that guides them to use metacognitive activities such as planning, monitoring, and evaluating their learning before class (Shih & Huang, 2019). The will to participate in the classroom learning in the FC is a factor that motivates students to develop self-directed behavior, self-reflection, self-assessment, and time and effort for extracurricular activities. This desire motivates students by raising their metacognition levels and this affects their follow-up behavior outside the classroom (Wang, 2019).

The Aim of the Study

As pointed out in the theoretical framework of the research, time and environment-related limitations are the main problems of writing education. Essentially, these two limitations lay grounds for other problems such as not giving feedback, not being able to individualize teaching, not performing student-centered practices, and neglecting metacognitive processes. These problems are inevitable in the traditional understanding in which all teaching time is limited to the classroom within a fixed program. The FC approach is considered as a structured phase of the pre-class teaching process and the theoretical dimension of the teaching is moved to this phase and the pre-class, and the classroom time is devoted to teaching, practical and cooperative activities. Hence, it is considered that this approach can be used in eliminating such problems. In this context, the effect of the research on two basic variables, metacognitive writing awareness, and writing achievement, is researched. In this scope, the research questions of the study are as follows:

1) What is the effect of the FC model on students' general metacognitive writing awareness levels?

2) What is the effect of the FC model on students' metacognitive writing awareness dimensions (declarative knowledge, procedural knowledge, conditional knowledge, planning, monitoring-evaluation-debugging)?

3) What is the effect of the FC model on students' story-writing achievement?

Method

Research Model

The quasi-experimental design '*unpaired pre-test-posttest control group design*' was used in the study. The design of the study is given in Table 1:

Table 1. Unpaired pre-test-posttest control group design

Group	Pre-test	Treatment	Post test
Exp. Group (FC)	O1 (MWAS, NTAR)	Teaching Writing Based on FC Model	O3 (MWAS, NTAR)
Cont. Group (F2F)	O2 (MWAS, NTAR)	Teaching Writing Based on Traditional Face-to-Face	O4 (MWAS, NTAR)

Note. FC: Flipped Classroom, F2F: Face-to-Face, MWAS: Metacognitive Writing Awareness Scale, NTAR: Narrative Text Analytic Rubric

As shown in Table 1, pre-tests were applied to the experimental group and the control group to test the effect of FC model on metacognitive writing awareness and story writing achievement variables. Afterwards, experimental group was taught the story writing process based on FC model and final tests were applied to both groups at the end of the practice.

Participants

The research was carried out in a middle-school which is located in Black Sea region of Turkey and totally 55 (28 experimental, 27 control) 7th grade students participated in the study. 11 of the students in the experimental group are female and 17 of them are male.

Criterion sampling which is one of the purposive sampling methods was used in the selection of the participants. In criterion sampling, situations are selected that show the characteristics of the predetermined criteria (Patton, 2014). The criteria taken into consideration in this context are: (a) a student profile distribution that varies in terms of socioeconomic dimension and achievement level, (b) the interactive school board, projection, etc. a learning environment with technological equipment, (c) students in the working group have access to online resources such as computers and Internet.

Measures and Data Analysis

The data of this study were collected with the 'Metacognitive Writing Awareness Scale' (MWAS) developed by the researcher and "Narrative Text Analytic Rubric" (NTAR) by Beyreli and Arı (2009).

Metacognitive Writing Awareness Scale (MWAS): The metacognitive writing awareness of the students before and after the practice was determined by using the 'MWAS' developed by the researcher. On this scale, there are 5 factors and 23 items in total, including procedural knowledge, conditional knowledge, declarative knowledge, monitoring-evaluation-debugging and planning. Factor loads of the items ranged between .336 and .724. Confirmatory factor analysis was performed to confirm the latent trait determined by factor analysis. According to the results of the confirmatory factor analysis, the factor description rates of the substances ranged from 0.51 to 1.38. When the coefficients are examined, it is seen that the level of representing all of the items (observed variable) is its own latent variable is significant at the .05 level.

The fit indices calculated as a result of confirmatory factor analysis are as follows: ($X2/sd=1,536$, standardized root mean square residual (SRMR) = .041, comparative fit index (CFI) = .945, incremental fit index (IFI) = .946, root mean square error of approximation (RMSEA) = .050, adjusted goodness of-fit index (AGFI) = .911. These values show that the model is in good consistent with the data (Brown, 2006; Tabachnick & Fidell, 2007). In the reliability analysis, the Cronbach's Alpha value of the whole scale was calculated as .833. This value for procedural knowledge dimension is .577; for conditional knowledge dimension .603; for declarative knowledge dimension .573; for monitoring-evaluation-debugging dimension .610 and for planning dimension .699.

The categories in the 5-point Likert-type scale was determined as totally suitable for me (5), very suitable (4), appropriate (3), less suitable (2) and not suitable at all (1). Analyzes made in the last form of the 23-item scale which was formed as a result of the validity and reliability study shows that the lowest score is 23 and the highest score is 115.

Narrative Text Analytic Rubric (NTAR): In this study, the stories of the students were scored by using the 'NTAR' developed by Beyreli and Arı (2009). The Instruction consists of three sections and ten attributes: external structure (form, spelling and punctuation), language and expression (words, sentences, paragraphs, expression), editing (title, line, problem, solution). The characteristics are defined according to the levels (size / degree) and are based on attributes such as very good (4) level of impressiveness, good (3) level accuracy or completeness, moderate (2) level of deficiency, weak (1) level of inaccuracy or poor.

Datas were analyzed by IBM Statistics 22.0 data analysis program. The research questions and the statistical processes in accordance with these questions are given in Table 2.

Table 2. Data Analysis Map

	Research Question	Measuring Tool	Data Analysis
1	What is the effect of the FC model on students' general metacognitive writing awareness levels?	MWAS	Two-Way Variance Analysis for Mixed Measures
2	What is the effect of the FC model on students' metacognitive writing awareness dimensions (declarative knowledge, procedural knowledge, conditional knowledge, planning, monitoring-evaluation-debugging)?	MWAS	One-Way Variance Analysis
3	What is the effect of the FC model on students' story-writing achievement?	NTAR	Two-Way Variance Analysis for Mixed Measures

As shown in Table 2, two-way variance analysis for mixed measures was used in the data analysis related to the first and third research questions. In this analysis, different and same groups are measured consecutively. One of the factors represents groups and the other represents measurements; therefore, group factor (experimental and control) and measurement factor (pre-test and post-test) are formed of two stages (Can, 2014, p. 247). In this practice, there are two different groups, the control group (face-to-face model) and the experimental group (FC model). Repeated measures (pre-test and post-test) were performed in order to see changes in the story writing achievement and metacognitive writing awareness scores of the groups.

Validity and Reliability of the Data

In order to ensure that the scores obtained were qualified and comparable, two identical groups were selected and were not biased in sample selection. In the selection of these groups, it was paid attention that the number of participants was close to each other. The study was limited to eight weeks to avoid maturation effect which is one of the factors threatening validity. During the study, there was no loss of subjects that would interfere with weekly applications.

Within the scope of the study, a researcher journal was kept by the researcher in which observations about the situations and events that occurred during the application process were recorded. In this journal, in addition to in-class and out-of-class applications, a lot of information has been recorded from time to time about the analysis or quizzes, literature review notes and lesson plans.

Stories written by the students in the control and experimental groups at the beginning and end of the application and used as pre-test and post-test data were scored by the practitioner and two different experts according to the criteria in the rubric. The average of the scores given by three different experts for each student was accepted as the story writing achievement score of that student. In addition to this, in order to determine the level of consistence between three different raters, Krippendorff's alpha reliability test (Hayes & Krippendorff, 2007) was conducted. The coefficient of concordance calculated by using KALPHA Macro on SPSS 22.00 is found to be $\alpha = .902$ in pre-test and $\alpha = .911$ in post-test for the control groups; and $\alpha = 940$ in pre-test and $\alpha = 934$ in post-test for the experimental group. Krippendorff (2004) reveals that coefficients meeting the condition of $\geq .800$ can be trusted and this indicates a high level of concordance. Therefore, the high concordance between three raters who made the assessment revealed that the scoring was reliable.

Procedure

In the study, 7C Model (Conceptualize, Create, Communicate, Collaborate, Consider, Combine, Consolidate) developed by McGrath, Groessler, Fink, Reidsema, and Kavanagh (2017) was used. This model offers a template that can be used in planning a series of stages, such as accessing to technology,

to the creation of videos, from sharing videos to communicating with researchers and students, from the merging of the obtained data to the reporting of the research which were also offered FC model.

During the research process, the instructor designed activities/materials to improve students' knowledge and competence levels in story writing, provided appropriate inputs to enable students to develop a deeper understanding of the content, and provided appropriate product support and feedback to improve their writing skills and metacognitive writing awareness. In the control group, the content was presented face-to-face in the classroom during teaching and learning process; students were given traditional writing practices and homework which were created in the classical style. Different story samples were read in the classroom and related questions were asked to the students, and when the time was not enough, writing activities were given to the students as homework. The same content was presented to both groups with different applications.

During the eight-week study, the students in the experimental group were taught story writing based on the FC model. This teaching included topics such as; description and characteristics of the story, main idea, subject, theme, finding a title, introduction to the story, body and conclusion sections, narrator perspectives, narrative techniques, physical and mental description, use of humor, dialogue writing, originality and style, different ways to finish the story and common mistakes in stories.

The majority of FC-based writing activities were conducted in the classroom. In addition, students' answers to open-ended questions in the videos shared in the pre-class stage were recorded. Since the majority of the writing studies conducted during the application process only covered a certain dimension of story writing, story writing achievements of students were evaluated through the stories they wrote before and after the application. Both writing studies were carried out in the class. In these stories, students were not given a specific topic and they were asked to write stories on a topic of their choice. Other writing elements within the eight-week period were generally evaluated to provide feedback to the student and to help them produce a more qualified writing product.

All these studies were planned and implemented for at least one of the aims of increasing students' metacognitive writing awareness and story writing success. While some writing practices stay directly within the scope of either writing success or metacognitive writing awareness, others are able to develop both competencies. The writing practices carried out in the classroom and majorly planned to increase writing success of student are as follows: a) filling the gaps given in the story map in the worksheet with the appropriate characters, place, main event, problem, the solution of problem, and theme, b) interpreting an event around a certain subject and in the integrity of meaning based on visuals, c) giving descriptions of characters and places based on visuals, d) writing the theme, subject, and main idea through the activity of think-pair-share, e) completing a text of which some part is given, f) re-writing the listened text by paying attention to the elements of the story, g) summarizing a text with a mind map in both visual and written form, h) writing dialogs in the speech bubbles left blank in the cartoons in accordance with the plot of the text and forming a new text containing these dialogues, i) putting the mixed sentences into an order, j) turning direct narration into indirect narration, k) finding the spelling mistakes in the short text provided, l) detecting the incoherency in the given sentences, m) re-writing a given sentence with different types of sentence structures to have the same meaning, n) expanding short sentences by adding different words and phrases. The writing practices carried out to develop direct metacognitive writing awareness are as follows: a) revealing the relationship between the learned subject and previous videos, b) comparison of what is known before the video and what is learned after watching the video, c) preparing a written self-evaluation related to the story, d) making an evaluation related to the whole story or only one part of the story, e) determining the strengths and weaknesses of the writing, f) making a peer evaluation.
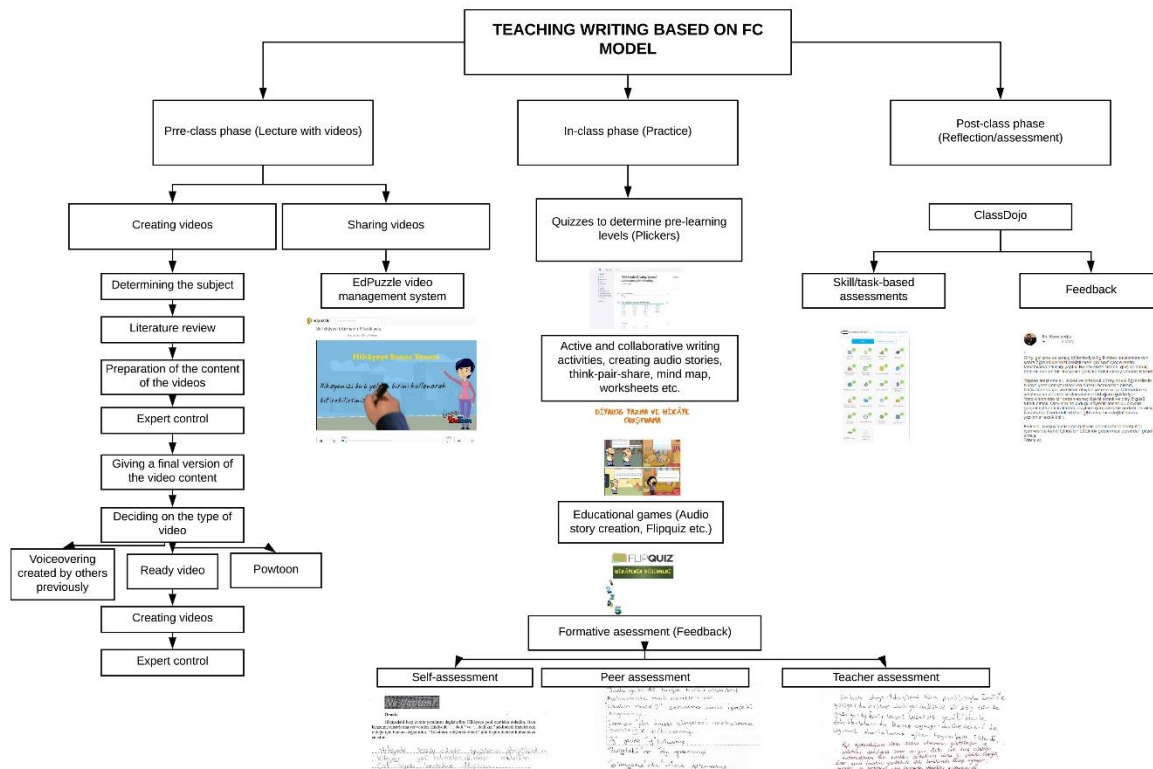
The flow chart of the research process is as follows:

Figure 1. The Representation of Teaching Writing Based on FC Model with Flow Chart

As seen in the Figure 1 Teaching in the FC group was carried out in three main stages as being pre-class, in-class, and reflection/evaluation. 24 different video were created in the pre-class stage by considering the literature about the video creation in FC model (Bergmann & Sams, 2012; Brewer & Carroll, 2016; Helgeson, 2015; McGrath et al., 2017; Schmidt & Ralph, 2016). EdPuzzle learning management system was used to deliver the videos to the students in the pre-class stage. Using this platform, which is very functional in the implementation of FC model, a virtual classroom called "Story Class" was created and the videos were shared with the students in this virtual classroom. Not all videos are uploaded at the same time, but the videos were uploaded to the system sequentially based on the planning made by reviewing the relevant literature and taking expert opinions and suggestions into consideration. Uploaded videos were added information notes, explanations, and different types of questions (open ended, multiple choice, true/false, yes/no). Students' answers to the questions were recorded and feedbacks were given to these answers every week. In the classroom stage, interactive quizzes such as Plickers and Flipquiz were conducted in order to determine students' learning levels related to the videos shared in the pre-classroom stage and to ensure their motivation for the lesson; and collaborative and game-based writing activities emphasizing active learning were carried out. After these writing activities, students were given the opportunity to make self-evaluation and peer evaluation. At the reflection/evaluation stage, overall performance of students was evaluated at the end of each week on ClassDojo platform based on skill and task, and written feedback was given to the writing activities of students.

Results

The Effect of FC Model on Metacognitive Writing Awareness

Assumptions were tested in order to do analysis of variance for first research question. In this context, firstly normality tests were performed and the values of Shapiro-Wilk statistics were determined as $p > .05$; 'z' statistical values were found to be within the limits of ± 1.96 (experimental pre-test $z = 1.057$, post-test $z = -.828$, control pre-test $z = -0.452$, control post-test $z = -0.593$). As a result of the Levene test, p> .05 was obtained in all pre-test and post-test measurements and there was no significant difference between the groups' variances. Also, Box's M test result is not significant (Box's $M = 1.231$, $p = 0.758$). Therefore, an equal covariance matrice assumption is also obtained. After all assumptions were met, it was understood that two-way analysis of variance could be performed for mixed measurements in while analyzing data.

Pre-test and post-test average scores and standard deviation values that showing the change in metacognitive writing awareness levels between the students in the experimental group (FC model) and the students (face-to-face model) are shown in Table 3:

Table 3. Average and Standard Deviation Values (MWAS)

Group	Pre-Test			Post-Test		
	n	$\overline{X}$	S	n	$\overline{X}$	S
FC (Exp.)	28	73.00	11.997	28	85.286	12.751
F2F (Cont.)	27	79.56	13.221	27	78.407	14.606

When the data in Table 3 are examined, it is seen that the pre-test average score of the FC Group ($X = 73.0$) is lower than the pre-test mean score of the traditional face-to-face group ($X = 79.56$). At the end of the eight-week practice, the average of metacognitive writing awareness of the experimental group increased 12 points to 85.286, but the average of the control group decreased by 1 point to 78.407. Results of two-way variance analysis for mixed measures experimental group showing that there is or isn't a significant difference according to the change in the control group are shown in Table 4:

Table 4. Two-Way Variance Analysis of Pre-test and Post-test Scores for the Metacognitive Writing Awareness Level

Source	SS	df		MS	F	Sig.
Between Subject	8262.046	54	1			
Group (FC/F2F)	.716		53	.716	.005	.946
Error	8261.33			155.874		
Within Subject	12198.4	55				
Measure (Pre-/Post test)	852.530		1	852.530	4.471	.039
Group*Measure	**1240.31**		**1**	**1240.312**	**6.505**	**.014**
Error	10105.56		53	190.671		
Total	20460.446	109				

When Table 4 is examined, it is seen that the common effect of group and measurement has a significant effect on students' scores from Metacognitive Writing Awareness Scale [$F_{(1,53)} = 6.505$, $p < .05$]. The variation between the repeated measures showed a significant difference according to treatment groups. Accordingly, being in the experimental group has a positive effect on metacognitive writing awareness and FC model is more effective in developing metacognitive writing awareness than in the traditional face-to-face classroom model. In other words, the difference between the pre-test and post-test scores of the experimental group was significantly higher than the difference between the pre-test and post-test scores of the control group.

Regardless of the difference between the consecutive measurements in terms of the main effect of the group, it was determined that the total scores of the students in the experimental group from the pre-test and post-test did not differ significantly from the scores of the students in the control group [$F_{(1,53)}$=0.005, $p > .05$]. This increased the pre-test average scores of the control group by approximately 6 points and increased the score of the experimental group at the end of the study. This can be explained as follows: Pre-test average scores of the control group were approximately 6 points higher and this increased the score of the experimental group at the end of the experiment, however, there was a difference of less than half a point between the pre-test and post-test total score of the experimental group and the pre-test and post-test total score of the control group. When the main effect of measurement was examined, it was determined that the scores of the students who participated in the practice were significantly higher than the scores before the experiment. This reveals that, when 28 students (FC model) and 27 students (face-to-face) are considered as a whole group, there was a significant difference between the post-test average scores of the 55 subjects and the pre-test average scores [$F_{(1,53)}$= 4.471, $p < .05$]. The average of the final test of the experimental group was significantly higher than the pre-test average which has an important role to develop significant impact on the metacognitive awareness of the measurement effect.

In general, with the effect of metacognitive writing of the group increased, the mutual effect of the measurement and the measurement effect was statistically significant. At the same time, the difference between the pre-test and post-test scores was excluded and only the total scores were compared to the experimental and control groups. So, effect of procedure was not significant. The change in metacognitive writing awareness of the groups is shown in Figure 2:
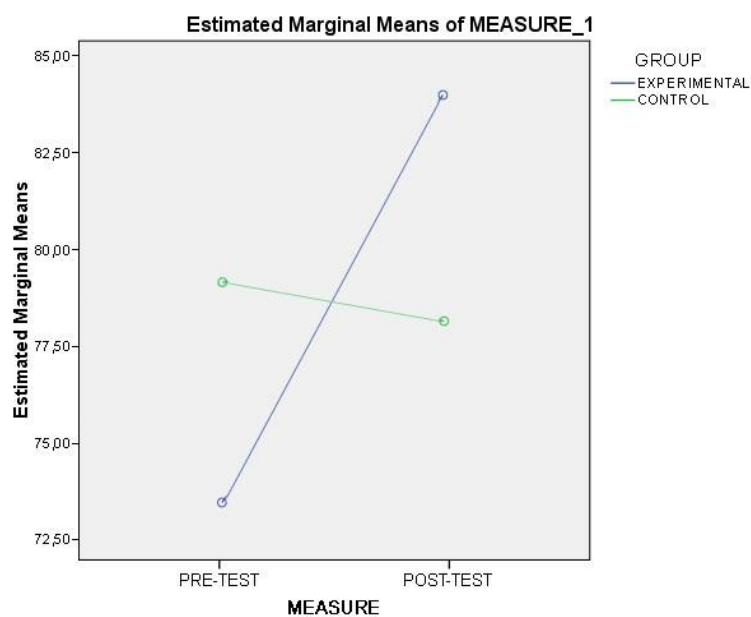
Figure 2. Time-Dependent Change in Metacognitive Writing Awareness Levels of Experimental and Control Groups

As shown in the Figure 2, in the pre-test measurement, the difference between the averages in favor of the control group differed in favor of the experimental group in the post-test. While there was a significant increase in the change of the experimental group, the change of the control group which was high in the pre-test decreased in the post-test.

The Effect of FC Model on Dimensions of Metacognitive Writing Awareness

One-way analysis of variance for the second research question is used to test "whether there is a statistically significant difference between at least two of the averages for more than two independent groups" (Can, 2014, p. 146). There are five different metacognitive writing dimensions (procedural knowledge, conditional knowledge, declarative knowledge, monitoring-evaluation-debugging, planning) to compare the averages. The normality tests at five levels revealed that each level showed normal distribution and the Levene test showed that all of the sub-dimensions and variance for the whole test were homogeneous ($p > .05$). Therefore, basic assumptions of variance analysis are obtained.

The distribution of arithmetic average and standard deviation values of metacognitive writing awareness dimensions (procedural knowledge, conditional knowledge, declarative knowledge, monitoring-evaluation-debugging, planning) according to pre-test and post-test are given in Table 5.

Table 5. Arithmetic Average and Standard Deviation Values of Metacognitive Writing Awareness Dimension (ÜYF) According to Pre-Test and Post-Test

Dimensions		N	$\bar{X}$	Sd
PK	EG (pre-test)	28	8.8929	2.18309
	EG (post-test)	28	10.3929	2.87182
	CG (pre-test)	27	9.7778	2.27585
	CG (post-test)	27	9.9630	2.08440
CK	EG (pre-test)	28	10.7857	1.98806
	EG (post-test)	28	12.2857	1.99735
	CG (pre-test)	27	11.6667	2.16617
	CG (post-test)	27	11.9259	2.40074
DK	EG (pre-test)	28	20.3929	2.37797
	EG (post-test)	28	22.1071	3.02262
	CG (pre-test)	27	21.2963	3.63545
	CG (post-test)	27	21.5185	3.35548
MED	EG (pre-test)	28	15.3571	3.00881
	EG (post-test)	28	18.4643	3.23731
	CG (pre-test)	27	17.4815	3.54499
	CG (post-test)	27	16.4074	4.39632
P	EG (pre-test)	28	18.3571	3.58199
	EG (post-test)	28	21.7143	4.37888
	CG (pre-test)	27	19.2593	4.64586
	CG (post-test)	27	21.7143	4.37888

Note. PK: Procedural Knowledge, CK: Conditional Knowledge, DK: Declarative Knowledge, MED: Monitoring-Evaluation-Debugging, P: Planning.

As it is shown in the Table 5, an equal number of participants were in the control and experimental groups. In addition, the post-test scores of the experimental group were higher in all dimensions. The lowest pre-test averages also belong to the experimental group.

In order to make multiple comparisons for each dimension of the FC model and to determine possible significant differences, Scheffe which is a multiple comparison test was used. The values for multiple comparisons with the Scheffe test are shown in Table 6.

Table 6. One-Way Variance Analysis Regarding Dimensions of Metacognitive Writing Awareness Scale (MWAS)

Dimension	Source	df	SS	MS	F	p	Sig.
PK	Between Groups	3	33.386	11.129	1.969	.123	-
	Within Groups	106	598.987	5.651			
	Total	109	632.373				
CK	Between Groups	3	34.274	11.425	2.490	.064	-
	Within Groups	106	486.280	4.588			
	Total	109	520.555				
DK	Between Groups	3	42.491	14.164	1.450	.233	-
	Within Groups	106	1035.728	9.771			
	Total	109	1078.218				
MED	Between Groups	3	150.766	50.255	3.927	.011	EG_{post}^{*}-EG_{pre}
	Within Groups	106	1356.652	12.799			
	Total	109	1507.418				
P	Between Groups	3	194.163	64.721	3.442	.019	EG_{post}^{*}-EG_{pre}
	Within Groups	106	1993.328	18.805			
	Total	109	2187.491				

Note. EG_{post}^{*}: Significance in favor of experimental group post-test

When the average scores in the procedural knowledge dimension in Table 6 are examined, it is seen that the average of the students in the experimental group is increased from pre-test to post-test compared to the average of the students in the control group. Accordingly, the post-test average (EG_{post} = 10.39) of the experimental group was approximately 1.5 points higher than the pre-test average (EG_{pre} = 8.89), while the post-test average of the control group (C_{post} = 9.96) was only 0.18 points above the pre-test average (C_{pre} = 9.77). However, the results of the analysis in Table 6 showed that the changes among the groups, including the increase in the experimental group, were not statistically significant and the scores obtained from the procedural knowledge dimension did not differ significantly between the four different groups ($F_{(3,106)}$ = 1.969, $p > .05$).

When the averages of conditional knowledge are examined, it is seen that the increase in the experimental group is more than the increase in the control group. Accordingly, the average of 12.28 in the pre-test increased by 1.5 points to 10.78 in the post-test, while the increase in the control group was only 0.3. However, this difference was not statistically significant ($F_{(3,106)}$ = 2.490, $p > .05$). Multiple comparisons showed that the scores of the statistical information were not statistically different.

In declarative knowledge dimension, the difference between the pre-test and post-test averages of the experimental group was greater than the difference between the post-test and pre-test scores of the control group. Accordingly, in the post-test of the experimental group's average increased by 1.7 points compared to the pre-test, whereas the increase in the control group was below 0.3 points. However, this difference is not statistically significant as the difference between the other categories ($F_{(3,106)}$ =1.450, $p > .05$).

The average of the experimental group which was 15.35 in the monitoring-evaluation-debugging were 18.46 in the post-test. Although the average scores of the students in the experimental group increased by more than 3 points, it was observed that the post-test average scores of the control group decreased by 1 point compared to the pre-test average. As shown in the table, there was a significant difference between at least two of the four groups in the evaluation and debugging dimension ($p < .05$). Scheffe multiple comparison tests were performed to determine the significant differences between the groups. The test results show that the increase in the experimental group was statistically significant and the post-test averages of the experimental group differed significantly from the pretest averages of the same group ($F_{(3,106)}$ = 3.927, $p < .05$).

In terms of planning dimension, the average of the experimental group, which was 21.71, was approximately increased 3.5 points compared to the pre-test average; control group post-test average increased 2.5 points compared to the pre-test average. Scheffe multiple comparison test showed that the increase in the control group was not significant and the increase in the experimental group was statistically significant ($F_{(3,106)}$ = 3.442, p < .05). This result shows that FC model has a statistically significant positive effect on increasing the students' scores in the planning dimension.

As a result of the test, calculated effect size is d = 0.667 in the dimension of monitoring-evaluation-debugging and d = 0.625 in the planning dimension. These effect sizes are mid-level according to Cohen's (1988) classification. In other words, FC model has a moderate (mid-level) impact on monitoring- evaluation-debugging size and planning dimensions.

The Effect of FC on Story Writing Achievement

The Box's M test for the third research question gave significant results (Box's M = 43, 058, p = .00). Therefore, an equal covariance matrice assumption is not obtained. For this reason, it is necessary to review both the assumptions of normality and the binary combinations of the measurement groups, therefore by eliminating the significance between the covariances of the groups, all of the data were transformed in order to continue the analysis with all assumptions met. Because of the "In order to observe a visible effect from transformations the ratio to standard deviation of the variable average should be less than 4." (Hair, Anderson, Tatham, & Black, 1995, as cited in Eroğlu, 2010, p. 222) is met, the data were found to be suitable for the transformation process and the data were distributed on the data logarithmically because of the positively skewed distribution (positive). Logarithmic transformation is also used in non-positively skewed distribution (Çiçek, 2010; Gürbüz & Şahin, 2014). The normal distribution of the data after logarithmic transformation was examined. It was calculated for the pre-test of the experimental group, as z = -0.531; for the post-test as -0.712; for the pre-test of the control group as z = -0.102 and for the post-test as z = -0.027. Shapiro-Wilk values support this data (p > .05). As a result of the Levene test, there was no statistically significant difference between the variance of the experimental and control groups for both measurements (p > .05). Re-performed Box's M test gave a statistically insignificant result (Box's M = 5.429, p = 0.157). Therefore, after the transformation process, homoscedasticity was obtained, and it was understood that two-way analysis of variance could be performed for mixed measurements in the analysis of the data.

In Table 7 it's shown that the pre-test and post-test average scores and standard deviation values of the students in the experimental group who were taught story writing based on the FC model and the change in the writing achievement scores of the students who were taught story writing based on the traditional face-to-face teaching:

Table 7. Arithmetic Average and Standard Deviation Values of Achievement Rate of Story Writing According to Pre-Test and Post-Test

Group	Pre-test			Post-test		
	N	$\bar{X}$	S	N	$\bar{X}$	S
FC (Experimental)	28	1.942	0.165	28	2.081	0.163
F2F (Control)	27	1.929	0.192	27	1.950	0.179

When Table 7 is examined, it was found out that the pre-test achievement score of the students who were taught the story writing based on FC model (experimental group) was 1.942; after the experiment it is seen that their average is 2.081. The average scores of the students in the traditional face-to-face group were 1.929 before the practice and this increased to 1.950 after the practice. When the average scores were considered, both groups scores are increased, but the experimental group's increase was higher. Two-way variance analysis results whether the increase in the experimental group showed a significant difference according to the change in the control group or not are shown in Table 8.

Table 8. Two-Way Variance Analysis Results of Pre-Test and Post-Test Scores of Story Writing Achievement

Source	SS	df		MS	F	p
Between Subjects	.357	54	1			
Group (FC/F2F)	.144		53	.144	2.381	.000
Error	.213			.061		
Within Subjects	.301	55				
Measure (Pre-/Post-test)	.176		1	.176	327.884	.000
Group*Measure	**.097**		**1**	**.097**	**180.992**	**.000**
Error	.028		53	.001		
Total	.658	109				

Datas on a two-way variance analysis for mixed measurements to test whether FC model-based teaching story-writing has a significant effect on achievement score or not are shown in Table 8. And these datas revealed that, story writing achievement scores of the students who participated in two different teaching of story writing experiment showed a statistically significant difference after the experiment [$F_{(1,53)}$ = 180.992, $p < .05$]. In other words, the common effect of repeated measure factors expressing time-dependent change and factor of being in experimental and control groups effect students' story writing achievement. Teaching story writing based on FC model and teaching story writing with traditional face-to-face model have different effects on increasing students' story writing achievement scores. In the experimental group, the increase in the number of time-dependent story-writing achievement scores were higher than in the control group. For this reason, FC model is more effective for teaching story writing than traditional face-to-face model. When the time-dependent change is ignored and only the group's main effect is examined, it is seen that the total scores of the students in the experimental group from the pre-test and post-test are significantly higher than the scores of the students in the control group [$F_{(1,53)}$=2.381, $p < .05$]. Within the scope of the research question, the main effect of measurement was examined with considering the different groups as one and it was determined that the scores of the students who participated in the study were significantly higher than the scores before the experiment. In other words, the measurement effect has a significant effect on achievement [$F_{(1,53)}$ = 327.884, $p < .05$]. The change in story writing achievement scores of the groups is shown in Figure 3:
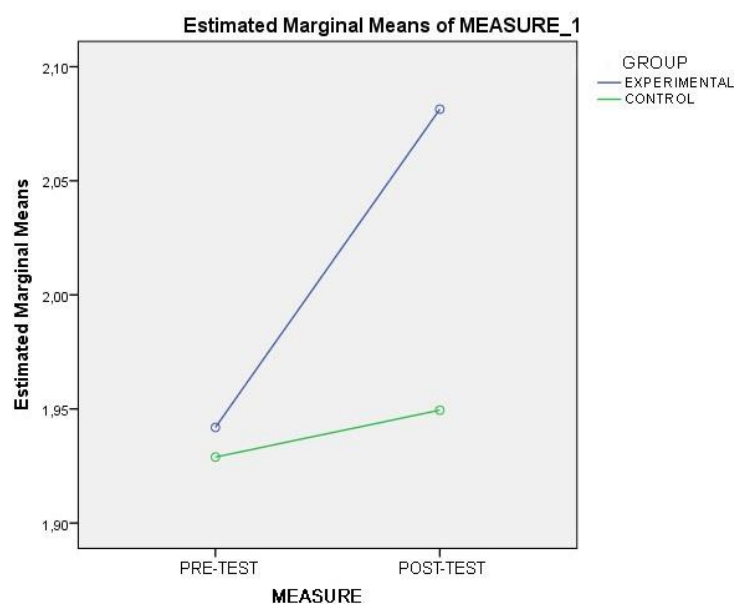
Figure 3. Time-Dependent Change in Story Writing Achievement Levels of Experimental and Control Groups

As shown in Figure 3, the averages in the pre-test measurement of the experimental and control groups are slightly different from each other. But after eight weeks of practice, it was differentiated in favor of the experimental group.

Discussion, Conclusion and Suggestions

This research aims to detect the effect of story writing education based on the FC model on metacognitive writing awareness of secondary school seventh-grade students in terms of development and writing achievement levels in five different dimensions of metacognitive writing awareness (declarative knowledge, procedural knowledge, conditional knowledge, planning, monitoring-evaluation-debugging).

The findings of the study showed that the FC model is significantly more effective than the traditional face-to-face teaching method in developing students' general metacognitive writing awareness. In five different dimensions of metacognitive writing awareness, no significant difference was found between experimental and control groups. The significant difference is only between the pretest and posttest scores of the experimental group from obtained the dimensions of planning and monitoring-evaluation-debugging. In addition, it was concluded that the FC model is significantly more effective on students' story writing achievement than traditional face to face teaching.

These conclusions regarding the metacognitive writing awareness are in line with the results which reveal the relationship between the FC and metacognition in the literature (Göğebakan Yıldız & Kıyıcı, 2016; Limueco & Prudente, 2019; Shih & Huang, 2019; Van Vliet, Winnips, & Brouwer, 2015; Yılmaz & Baydaş, 2017). In addition, similar results were also obtained in studies which show the relationship between self-regulated learning, which is an umbrella term of metacognition and the FC (Ghufron & Nurdianingsih, 2019; Jdaitawi, 2019; Moos & Bonde, 2016; Tan, Yue, & Fu, 2017; Wang, 2019). The videos, self-control and feedback opportunities, group studies, cooperative practices, student-centered reflection, and evaluation activities are shown as the factors that trigger metacognitive development in these studies. The finding obtained from the present study is also interpreted within a similar causality. In this respect, students should know about writing notes, questions and explanations on videos, writing topics, processes and strategies; see the deficiencies in their writings with the effect of the feedback given throughout the process; they have sufficient time for planning and evaluating their writings and the entire process is under their own responsibility. All these are possible causes of a positive impact on metacognitive awareness levels.

The results of writing achievement also match the findings of the studies in the literature (Baranovic, 2013; Crisafulli, 2015; Engin, 2014; Leis et al., 2015; Özbilen, 2018; Özdemir, 2017; Pavanelli, 2018; Said Ahmed, 2016; Soltanpour & Valizadeh, 2018). In all these studies, elements such as active learning opportunities, unlimited repetition, teacher guidance, feedback, collaboration opportunities, and frequent writing activities in the FC were reported as reasons for the development of writing achievement. In the present study, it is thought that the reasons in question positively affect writing achievement. First, the development in the writing skill should be explained with the factors which are involved in the FC, but not in traditional face-to-face teaching. The primary factor is pre-class preparation. Students, who watch the videos with the content in the pre-class phase before the course involving writing practices, become more active in the classroom and can devote more time to practical work. Students, who can control the level of awareness and knowledge about the content of writing through quizzes held at the beginning of the lesson, can reinforce their learning with practical and collaborative activities. Besides, with the feedback they receive from their peers and teachers, they complete their missing information and create more qualified writing products. In this way, in-class time is used much more efficiently.

Considering that the writing skill can be improved by practice, it requires a planned process and feedback is important in this process, it can be suggested that the FC is an appropriate approach for writing education. The pre-class phase allows the presentation of the theoretical framework required for writing education; in-class phase allows performing writing practices based on practice and

collaboration; the reflection/evaluation phase allows giving feedback. The use of videos in the teaching process allows students to repeat topics wherever and whenever they want while allowing them to complement their learning gaps.

All these results reveal that the FC can be useful in writing education. Because the FC's pre-class, in-class and reflection/evaluation phases are in a structure that overlaps with the important concepts of writing such as preparation, implementation, feedback, and metacognition. The FC approach also allows methodological variety in writing practices. For this reason, a single method or technique should not be adhered to in practices, techniques that would contribute to the active participation of students should also be used. In addition, videos shared before the class can be used as a tool to improve students' writing achievement as well as their metacognition. Students can develop awareness about their own strengths and weaknesses with questions and explanations to be added to videos.

Although the FC is generally characterized by pre-class phrase and video narration, the in-class phase is at least as important as pre-class. The activities at this phase also need to be well planned and structured to achieve writing education achievements. During this process, students should frequently write, and feedback should be given. Furthermore, to get a high level of efficiency from this education, issues such as resources, technical opportunities, limitations, and time management should be taken into consideration and good planning should be made. Within this framework, it should be determined which writing subjects and strategies will be taught, what materials will be used, and what arrangements will be made to ensure the continuity of students' interest and motivation. Necessary precautions should be taken to avoid the "digital gap" which indicates the differences between students' use of computer and internet access. In this context, the socioeconomic status and internet access opportunities of students should be explored before applying the FC approach. Otherwise, it will be difficult to reach the targeted learning outcomes with the approach.

Despite the popularity of the FC in the international arena, relevant research in the field of Turkish language education are not sufficient. In this sense, more research should be conducted on the FC in the learning areas of Turkish language education. Further studies to be conducted in the field of writing can investigate the effects of this method on affective factors such as writing anxiety, writing self-efficacy; on cognitive factors such as pre-learning levels; as well as critical thinking, reflective thinking, and higher-level thinking skills.

The present study is limited to the data obtained from a small sample. It includes data obtained from a single age group and is only based on quantitative data. This can limit the generalizability of the research findings. Therefore, larger samples can be used to determine the effect of the FC on metacognition.

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