New Trends and Issues Proceedings on Humanities and Social Sciences

Volume 4, Issue 6, (2017) 158-168

ISSN 2547-8818
www.prosoc.eu

Selected Paper of 6th International Conference on Education (IC-ED-2017), 26-28 June 2015, University of Zagreb Zagreb – Croatia

The effects of flipped learning approach on the academic achievement and attitudes of the students

Ruhan Karadag [a]*, Department of Primary Education, Faculty of Education, Adiyaman University, 02040 Adiyaman, Turkey

S. Serdar Keskin [b], Teacher of Mathematics in Sehit Ogretmen Ahmet Onay School, 34766 Istanbul, Turkey

Suggested Citation:

Karadag, R. & Keskin, S. S. (2017). The effects of flipped learning approach on the academic achievement and attitudes of the students. *New Trends and Issues Proceedings on Humanities and Social Sciences*. *4*(6), [Online]. 158-168. Available from: www.prosoc.eu

Selection and peer review under responsibility of Prof. Dr. Milan Matijevic, University of Zagreb, Croatia

Abstract

The purpose of this research is to examine the effects of activities based on 'Flipped Learning' approach on students' academic achievement and attitudes toward mathematics in mathematics lessons. A mixed method approach is used in this study. Quantitative data were collected through the academic achievement test developed by the researchers and the Mathematical Attitude Scale developed by Inan (2014). The qualitative data were obtained from the semi-structured interview form and the learning logs of the mathematics lessons that the students kept during the activities. In the analysis of quantitative data of the study, Statistical Package of Social Science programme was used to calculate and analyse arithmetic mean, standard deviation and t-test. In the analysis of qualitative data, content analysis was used. It is found that 'Flipped Learning' approach positively affect students' academic achievement and attitudes toward mathematics in mathematics lessons.

Keywords: Flipped learning, mathematic instruction, academic achievement.

* ADDRESS FOR CORRESPONDENCE: **Ruhan KARADAG,** Department of Primary Education, Faculty of Education, Adiyaman University, 02040 Adiyaman, Turkey.
E-mail address: rkaradag@adiyaman.edu.tr / Tel.: +90 (416) 223 3800-06

1. Introduction

Rapid advances in information and education technologies in today's world have led to new trends in designing and practising more efficient and effective learning-teaching processes. Recently, Flipped learning is one of the attention-grabbing concepts in the field of education. Flipped learning is quite a different approach from traditional teaching practices, which requires some changes in teacher and student roles. Contrary to traditional teaching, Flipped Learning is a pedagogical approach that the aims to have learners gain information outside the classroom; enhance and reinforce their learning in the classroom environment.

Flipped learning is an approach stemming from the idea of swapping homework for classwork (Ash, 2012). In flipped classrooms, learning is carried outside the classroom and individualised by means of technology (Kaya & Ozkeş, 2015, p. 101). It gives students opportunities to access to content for the next class that is suitable for individualised learning through asynchronous systems. In other words, flipped learning may be defined as the replacement of homework with in class practices (Bishop & Verleger, 2013). Bergmann and Sams (2012) and Zownorega (2013) define flipped learning as a method that allows students to learn theoretical information at home, as opposed to traditional methods and practise them in the classroom environment. On that note, flipped learning is basically about delivering classwork online and doing homework in the classroom (Kara, 2015).

The main aim of flipped learning is to have students ready for learning practices in the classroom (Bristol, 2014; Demiralay & Karatas, 2014). In this method, students deliver the theoretical part of a lesson at home through multimedia devices such as online videos and presentations. Also, in addition to the basic course materials provided by the teacher, students take the responsibility of their own learning and do more research to learn the assigned content (Seaman and Gaines, 2013). Therefore, flipped learning supports learner autonomy by giving them the opportunity to reach the information anywhere and anytime by means of lesson videos (Talbert, 2012). Another advantage of flipped learning is to move learning outside the classroom to deliver content; enhance learning and provide more opportunities for practice, which usually takes a great deal of time within limited class hours (Kong, 2014). It also enriches the learning environment, which increases the effectiveness of lessons and makes learning and teaching more communicative (Gencer, Gurbulak & Adıguzel, 2014). Other advantages of flipped learning include the opportunities for individualised learning regarding learning pace and styles as well as learning the content prior to practice; allowing students to take more responsibility of their own learning; and creating a more transparent learning environment carrying learning outside the walls of a classroom setting (Bergman & Sams, 2012; Miller, 2012; Herreid & Schiller, 2013).

1.1. Purpose of the study

The purpose of this study is to explore the effect of flipped classroom practices on the attitudes of students in Math classes towards Math and their academic success in Math. The research questions are as follows:

- Do flipped classroom practices have an impact on students' academic success in Math classes?
- Do flipped classroom practices cause a change in the attitudes of students towards Math classes?
- How do the students perceive flipped learning approach?

1.2. The significance of the study

Math concepts are considered highly hard to teach because Math is based on abstract notions. In addition to its abstract nature, ineffective teaching methods are among the main causes of negative attitudes towards math lessons (TED, 1994, p. 49). The main requirement of success in math depends on different and interesting approaches and methods used in learning and teaching processes.

Ozyurt and Ozyurt (2017) state that different studies have been conducted about flipped learning in different fields ranging from educational sciences to nursing and medicine. In the relevant literature, there have been studies on flipped learning in teaching programming and algorithm in engineering (Ozyurt & Ozyurt, 2017), in teaching biology (Moravec, Williams, Aguilar-Roca & O'Dowd, 2010), in computer training (Talbert, 2012), in teaching English (Boyraz, 2014), in teaching writing in English (Ekmekci, 2014) and in physics classes (Winter, 2013). Goodwin and Miller (2013) points out the fact that in the literature there is little research on the effectiveness of flipped learning by taking different variables into consideration. Also, few experimental studies on flipped learning may be found in the relevant literature and almost no studies on the applicability of flipped learning (Gencer, Gurbulak & Adıguzel, 2014). So far, no studies have been reported on flipped learning in teaching math in our country. On that note, this study is aimed to fill this gap in the literature.

1.3. Limitations

In this studies, there are some limitations:

- The results are limited to 26 students participated in the study in 2016–2017 academic year; Grade 8 - Istanbul ehit Ahmet Onay Elementary School.
- The content is limited to '*Pythagoras Theorem*' under the theme 'Geometry and Measurement' on Math curriculum (Grade 8).

2. Methodology

2.1. Research design

Mixed method was employed in this study which aims to explore the effect of flipped learning about *Phytogerean Theorem* in relation to Geometry and Measurement in a Grade 8 *Math* class on students' academic success and their attitudes towards *Math.* To collect quantitative data, of the experimental models, one sample pre-*test* and post-test design was used. As for the qualitative data, a semi-structured interview form developed by the researchers and diaries kept by the participants in the process of study were utilised.

2.2. Participants

In this study, purposive sampling technique, one of the non-random sampling techniques, was used. 26 Grade 8 students (14 female and 12 male) formed the experimental group, studying at Istanbul Sehit Ahmet Onay Elementary School, who had a personal computer and Internet access at home.

2.3. Instruments

The quantitative data was collected by the Academic Success Test developed by the researchers and Math Attitude Scale (Inan, 2014). The scale consists of 25 items–12 negative and 13 positive. The reliability score of the scale is 0.942. As for the validity of the Academic Success Test developed by the researchers, expert opinion (i.e. external audits) was referred and necessary changes in the items were made accordingly. This led to the conclusion that the items on the test were clear and intelligible; and were appropriately chosen for the target content. To ensure the reliability, the test was administered in a different school setting with different participants. The qualitative data was collected by the semi-structured interview forms (7 questions) and the digital Math diaries kept by the students in the process of study. To validate the interview questions, the form was given to three experts and necessary changes were made according to their feedback.

2.4. The analysis of the data

The analysis of the quantitative data was done by means of Statistical Package of Social Science (SPSS) and arithmetic means, standard deviation and paired sample t-test analyses were computed. As for the qualitative data, content analysis was used. The data from the semi-structured interviews and student diaries were analysed by means of content analysis method.

2.5. The experimental study application procedure

Prior to the experimental study, Math Attitude Survey and pre-test were administered in the group. Also, Google Classroom and Google applications (Drive, Youtube, Google Search, Google Calendar, Google+, Google Docs) were introduced and explained in detail by the Math teacher. The students received a 5-hour training in total about these applications. Then, the teacher opened a Google Classroom and the participants in the experimental group joined in the classroom. Flipped learning videos were shared with the students by means of Google Classroom. The videos prepared by the teacher were shared on Google Classroom to have the students come to the class prepared. In the course of the study, the students were informed via text messages and emails when the teacher shared something on Google Classroom, which helped ensure that the students would watch the videos before coming to the classroom. The students were also asked to keep diaries to reflect on flipped classroom practices. At the end of the process, the students were given the post-test and Math Attitude Scale.

2.6. The validity and reliability

In order to test the validity and reliability of the qualitative data, as suggested by Creswell (2003), Triangulation, External Audits, Rich & Thick Description and Chain of Evidence methods were utilised. In the study, two different collection methods were used, hence variety in data collection methods. The data from the Academic Success Test and semi-structured forms were analysed comparatively. In developing of the data instruments and determining the stages of the study, one expert in the educational sciences field contributed to the study. This expert has experience and studies in quantitative/qualitative research methods and technology integrated curriculum design.

In this study, the following measures were taken to ensure its validity and reliability: All stages in data collection and analysis processes were explained in detail. All the process, from the beginning till the end, was recorded. Conscious effort was put to ensure the objectivity. In the analysis and the interpretation of the qualitative data, direct quotations were taken from the participants' utterances. Also, different data collection tools were used. Different researchers took part in the study to ensure the accuracy of the data and the findings. Finally, the data, data analysis and coding were organised and stored for confirmation.

3. Findings

The findings are presented and interpreted under three headings: 'the effects of flipped learning in Math classes on students' academic success'; 'the effects of flipped learning on students' attitudes towards Math class'; and 'students' perceptions of flipped learning'.

3.1. The findings regarding the effects of flipped learning in Math classes on students' academic success

In order to investigate the effects of flipped learning in Math classes on academic success, pre-test and post-test were administered and the mean scores of pre- and post-test results were computed to find out if there was a significant difference between them by using t-test. Table 1 illustrates the results of the analysis.

Table 1. The average scores, standard deviation and t-test results regarding the Math pre-test and post-test success scores

Tests	*N*	*X*	Ss	Sd	*t*	*p*
Pre-test	26	9.65	2.89	25	10.034	0.000
Post-test	26	12.76	3.63			

As seen in Table 1, there is a statistically significant difference between the pre-test and post-test average academic success scores, which shows the effect of flipped learning on the academic success of students in Math. The average of students' Math pre-test scores is 9.65, standard deviation is 2.89, average post-test score is 12.76 and standard deviation is 3.63. The findings indicate an increase in the students' academic success. The *t* score of the average scores of pre- and post-tests, administered to evaluate the improvement of the participants in the Math class, was found to be significant at 0.05 level. This finding reveals that flipped learning has a positive impact on the students' academic success.

3.2. The findings regarding the effects of flipped learning on students' attitudes towards Math class

In order to find out the effects of flipped learning on students' attitudes towards math class, data on the attitude level of students towards math were collected and analysed to see if there was a significant difference by using paired sample t-test. In the interpretation of the findings, arithmetic means, standard deviation and p-value indicating the significance level were taken into consideration. Table 2 shows the results of the analysis.

Table 2: t-test results of the pre- and post-attitude scale towards Math

Tests	*N*	*X*	Ss	Sd	*t*	*p*
Pre attitude	26	2.85	0.344			
Post attitude	26	3.64	0.548	25	6.39	0.000

As seen in Table 2, the comparative results of the pre- and post-attitude mean scores show that the post-attitude mean score (3.64) is higher than the pre-attitude mean score (2.85). Paired sample t-test was computed to find out if 0.79, the difference between the pre- and post-attitude mean scores, was significant and t value was found 6.39. This value is higher than 2.02 at 0.05 level at 25 degrees of freedom, which shows that flipped learning has an impact on holding positive attitudes towards math class.

3.3. The perceptions of students towards flipped learning

The perceptions of students towards flipped learning were also qualitatively explored via the semi-structures interview form and digital student diaries. Their perceptions were analysed in five different categories. Table 3 shows the students' perceptions of the differences between flipped learning and previous practices in Math classes.

Table 3. Students' perceptions of the differences between flipped learning and previous practices in math classes

It helped me come to the class prepared. (K-1, E-6, K-7, E-7, K-10, K-11, K-12, K-13, K-14)
It helped me understand the subject better. (K-5, K-6, E-6, E-9, K-9, K-10)
It was efficient. (K-1, E-3,K-2, K-4, K-11, K-14)
My scores and my success increased. (E-1, E-3, K-2, E-6)
It helped me answer the questions quickly. (K-3, K-6, E-5, E-7)
It (the lesson) was more enjoyable. (K-4, E-5, K-8, E-10)
I started to participate more in the lesson. (K-5, K-10, K-13)
It helped the retention of the subject. (K-2, E-2, K-3, K-10)
It increased my participation in the class. (K-10, K-12)
It made me love Math more. (K-5)
It was easier for me because it was online. (E-2)
It increased my love to math. (E-4)
I started to do more tests. (K-3)

As seen in Table 3, flipped learning was considered different from traditional math classes for some reasons such as helping them be prepared for the lesson; being effective; contributing to understanding; and increasing participation. In support of this, one student stated the following:

'Because it is computer assisted, it is better. Because it is more enjoyable. Classes without computer assistance might be boring. I can now do things via my computer or smart phone apart from paper. I mean I can do my homework anywhere with Internet access'. (E-10)

Also, another student (K-10) stated that flipped learning helped increase class participation, have them be prepared for the lesson and help them understand the content better as seen in the extract below:

'My participation in the lesson was not much previously because I did not know anything about the (target) subject. After watching the videos, we were like revising (the content) in the lesson. I understand the lesson better now'.

Students' perceptions of the skills that flipped learning enhances are shown in Table 4.

Table 4. Students' perceptions of the skills that flipped learning enhanced

More retention and better learning (K-1, E-1, E-2, E-3, K-7, E-10, K-11, K-14)
Quicker problem solving skills (K-2, K-4, K-6, E-5, E-7, K-10)
Regular study habits (E-3,K-2, E-10, K-12)
Increase in comprehension (E-6, K-9, E-10, K-11)
Internet skills (K-13, K-14)
Thinking skills (E-7)
Visual perception (K-1)
Awareness of Math (K-5)
To express yourself skills (E-8)

As seen in Table 4, the majority of students stated that flipped learning contributed to retention and learning, improved their problem solving skills and helped maintain regular study habits. In addition, increased comprehension and computer skills were among the contributions that flipped learning provided. The following extracts from students support this.

'Thanks to flipped learning, I better understood the content and I started to study regularly'. (E-3)

'Watching the videos at home and revising them in the classroom contributed to our learning (and comprehension). We watch the videos prior to the lesson, so it is easier (to understand things)'. (K-11)

The data from the student diaries also provide support to flipped learning in helping them learn and retain information better. The student (K-3) expresses this in her diary as follows:

'Today we started to learn Pythagoras Theorem. We were ready for the class because we had watched the video Serdar (the teacher) prepared. We learned that the sum of the squares of the perpendicular edges in the right triangles is equal to the sum of the hypotenuse. The videos helped us better understand this'. (March 3, 2016)

The advantages of flipped learning are given in Table 5 below.

Table 5: Students' perceptions of the advantages of flipped learning

Helps understand the subject quicker (K-1, E-3, K-7, E-9, E-10, K-10)
Is an enjoyable method (K-4, K-5, E-6, K-8, K-9)
Provides access to the subject before the class (K-1, E-9)
Provides easy access to information (E-2, E-4)
Enhances learning and promotes success (E-3, E-5, E-6)
Allows students to revise and review things again and again (K-2)
Promotes positive attitudes towards Math (K-6, E-5)
Helps us be more prepared for the lessons (E-7, K-10, K-11)
Increases the interest in Math (K-10, K-14)
Is more enjoyable and efficient than working individually (E-1)
Helps make more time for Math (E-8)

As seen in Table 5, flipped learning is considered beneficial in helping students understand the subject quicker and come to class prepared; in providing students with opportunities to revise and review things again and again; and in being enjoyable and promoting positive attitudes towards Math. In support of this, some extracts from students' perceptions are given below:

'When there is something we do not understand, we can watch the video again. If it is still unclear, we can watch it again. That's why, it is a good method'. (K-2)

'Thanks to this (flilpped learning), we come to class more prepared and because we do activities about the things we know, the classes are more enjoyable'. (E-7)

'I like the way it (flipped learning) is available everywhere or it allows us to watch the videos (anywhere and anytime). Also, studying online via our telephones, tablets or computers makes it more enjoyable'. (K-14)

The data from student diaries also show that flipped learning helps students be prepared prior to the class, as seen in the following extract below:

'I watched the videos Serdar (the teacher) shared with us: 'Pythagoras: The Father of the Numbers', 'Pythagoras Theorem' 'The Proof of Pythagoras Theorem'. Thanks to these videos, I learned the connection between Pythagoras, how to prove Pythagoras Theorem and the properties of Pythagoras Theorem'. (March 3, 2016)

Table 6 below illustrates students' perceptions of the disadvantages of flipped learning.

No negative sides/disadvantages. It is highly positive. (K-1, E-2, K-5, K-6, E-5, E-6, K-7, E-7, E-9, K-11)
The number of tests I do has decreased. The test books are left untouched. (E-1)
I had to sit longer hours in front of the computer. (E-3)
I had trouble in downloading the videos. (E-9)
Kahoot was a problem because I did not have a telephone. (K-9)
The videos were short. (K-10)
I am happy with that. Actually there is no problem. (K-7)
There is nothing that I don't like. Indeed, I like it a lot. (E-7)

As seen in Table 6, the majority of the students stated that there was no disadvantage of flipped learning. However, some students pointed out some disadvantages that they had to sit longer hours in from of the computer screen and they had difficulty in downloading the videos.

Students' perceptions of the problems experienced in flipped learning are given in Table 7 below.

Table 7: The problems experienced in flipped learning

I had no problems. It was really good. (K-1, E-1, E-2, K-4, K-5, K-6, E-5, E-6, E-7, E-8, E-10, K-10)
The battery of my tablet died. (E-3)
Technical problems. (E-3)
Internet access problems. (K-11, K-14)
I had difficulty in opening the application. (K-12)
I had sore eyes and neck ache. (E-3)
I couldn't study when there was a power cut. (K-2
I had problems in downloading the videos. (E-4, K-13)
Time problems. (K-3, K-4)
Longer study hours. (E-8)

As seen Table 7, the most common problems experienced by students in flipped learning are the ones related to the Internet and downloading. The majority of the students expressed that they did not have any problems about flipped learning (see the extracts below).

'There was nothing I was unhappy with. Indeed, I liked it a lot'. (E-7)

'This study (flipped learning) was very beneficial to us. It helped us be prepared for the subject (prior to the class). So this is extremely good' (K-11)

4. Results, discussions and suggestions

This study aiming to explore the effects of flipped learning on students' academic success in math and their attitudes towards math utilised the mixed method approach in which quantitative and qualitative data were collected and analysed. The results of the study were presented by making connections with the findings of the quantitative and qualitative data.

The findings from the quantitative data revealed that flipped learning contributed to the academic success of students. This finding is similar to the findings of the study about the positive impact of flipped learning on students' success in math (Strayer, 2011). In the literature, there are other studies showing the contribution of flipped learning to students' academic success in other subjects apart from math. The study done by Moravec, Williams, Aguilar-Roca and O'Dowd (2010) shows that flipped learning contributed to students' academic success in biology; and the study by Wetterlund (2008) reveals the same in archeology, as well as the fact that it promotes learning, in other words, makes learning easier for students.

This study revealed that flipped learning contributed positively to the students' attitudes towards math. The results are similar to the results of the studies conducted by Abeysekera and Dawson (2015), Butt (2014), Davis et al. (2013), Gaughan (2014), Kong (2014) and Sever (2014), showing that flipped learning promoted positive attitudes towards math class and increased motivation.

Another aim of the study was to explore the perceptions of students towards flipped learning. On that note, the results revealed that flipped learning was considered more efficient that traditional ways of teaching math in helping students be prepared for the lesson, contributing positively to learning, enhancing retention, increasing success, promoting participation in class activities and being an enjoyable way of teaching/learning. In that sense, this result shows similarities with the studies done by Dogan (2015), Findlay-Thompson and Mombourquette (2014), Mok (2014) and Turan and Goktas (2015) in terms of making learning easier and enhancing better learning. Many studies in the

literature also show that students find easier to adapt to flipped learning; have positive attitudes towards it; and prefer it to traditional methods (Tan, Brainard & Larkin, 2015; Bosner, Pickert & Stibane, 2015; Wong, Ip, Lopes & Rajagopalan, 2014; Philipps, 2014; Tune, Sturek & Basile, 2013). The studies by Heitz, Prusakowski, Willis and Fransk (2015), Moffett and Mill (2014) and Wong, Ip, Lopes and Rajagopalan, 2014 reveal that students have positive attitudes towards flipped learning for reasons. For example, it provides positive learning experiences; and it is enjoyable, effective, productive and beneficial. Isman (2005) and Yalın (2003) state that because flipped learning practices appeal to different senses of students, it attracts more attention that traditional methods and it makes learning easier, hence enjoyable and quicker learning.

This present study shows that flipped learning is beneficial because it enhances retention, makes learning easier, promotes regular study habits, improves comprehension skills and helps develop computer skills. In addition to this, students find flipped learning quite effective because it makes learning easier; allows them to reach the information easily and review and revise things that they do not understand very well; helps them come to class prepared; makes remembering easier; increases interest in math; and is enjoyable. The study conducted by Ozyurt and Ozyurt (2017) also shows that the majority of students express positive attitudes towards flipped learning. Also, Miller (2012) find flipped learning effective because it allows students to learn at their own pace by letting them progress based on their skills and it provides students who miss classes due to absenteeism or illnesses with opportunities to reach the content whenever they want.

This study also reveals that the majority of students do not think that flipped learning had disadvantages. However, some students underline the fact that they have to sit longer hours in front of the computer and they have difficulty in downloading the videos. Based on the students' perceptions, the most common problems about flipped learning are the ones related to the Internet and downloading.

Considering the results of the study and the related literature, flipped learning is found quite effective and efficient in increasing academic success of students in math and promoting positive attitudes towards math. This might imply that applying new teaching methods in teaching-learning processes may help increase positive attitudes towards lessons and in having more efficient and effective lessons. It might also be stated that flipped learning is an appropriate and good method to apply in math classes and an effective variable in increasing positive student attitudes.

The following implications might be suggested considering the findings of the study:

- In math classes, flipped learning may be utilised to increase students' academic success in math and promote positive attitudes towards it.
- In service training may be given to teachers to apply flipped learning in their classes.
- An activity bank containing learning/teaching materials for math classes (e.g. videos, handouts etc.) may be created by working cooperatively with math teachers.
- A study may be conducted to explore the effectiveness of flipped learning to improve students' math skills and promote positive attitudes in comparison with traditional methods.
- In order to equip pre-service teachers with necessary skills to use flipped learning efficiently in their teaching, prior to their teaching career, their exposure to and active participation in flipped learning must be ensured by providing them with flipped learning practices. Hence, teacher candidates would be equipped with the skills to use flipped learning in their teaching as well.

References

Abeysekera, L. & Dawson, P. (2015). Motivation and cognitive load in the flipped classroom: definition, rationale and a call for research. *Higher Education Research & Development, 34*(1), 1–14.

Ash, K. (2012). Educators view 'flipped' model with a more critical eye. *Education Week, 32*(2), 6–7.

Bergmann, J. & Sams, A. (2012). *Flip your classroom: reach every student in every class every day*. Eugene, OR and Alexandria, VA: International Society for Technology in Education and ASCD.

Bishop, L. J. & Verleger, M. A. (2013, June 20–26). The flipped classroom: a survey of the research. *120th ASEE Conference & Exposition (American Society for Engineering Education)*.

Bristol, T. J. (2014). Educate, excite, engage. *Teaching and Learning in Nursing,* 9, 43–46.

Boyraz, S. (2014). *Evaluating flipped classroom/education method in English teaching* (Unpublished master thesis). Afyon Kocatepe University, Afyon,Turkey.

Bosner, S., Pickert, J. & Stibane, T. (2015). Teaching differential diagnosis in primary care using an inverted classroom approach: student satisfaction and gain in skills and knowledge. *BMC Medical Education, 1*(15), 63.

Butt, A. (2014). Student views on the use of a flipped classroom approach: evidence from Australia. *Business Education & Accreditation, 6*(1), 33–43.

Demiralay, O. G. R. & Karatas, S. (2014). Flipped classroom model. *Journal of Research in Education and Teaching, 3*(3), 333–340.

Dogan, T. G. (2015). Sosyal medyanın ogrenme sureclerinde kullanımı: Ters-yuz edilmis ogrenme yaklasımına iliskin ogrenen gorusleri. *Acık ogretim Uygulamaları ve Araştırmaları Dergisi, 1*(2), 24–48.

Ekmekci, E. (2014). *Flipped writing class model with a focus on blended learning* (Unpublished doctoral thesis), Gazi University, Ankara, Turkey.

Findlay-Thompson, S. & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education & Accreditation, 6*(1), 63–71.

Gaughan, J. E. (2014). The flipped classroom in world history. *The History Teacher, 47*(2), 221–244.

Gencer, B. G., Gurbulak, N. & Adiguzel, T. (2014). A new approach in learning and teaching: the flipped classroom. In A.C. Ilhan, A. Isman, C. Birol & A. Eskicumali (Eds.), *Proceedings of International Teacher Education Conference* (pp. 881–888). Sakarya, Turkey.

Heitz, C., Prusakowski, M., Willis, G. & Franck, C. (2015). Does the concept of the 'flipped classroom' extend to the emergency medicine clinical clerkship? *Western Journal of Emergency Medicine, 16*, 851–855.

Herreid, C. F. & Schiller, N. A. (2013). Case studies and flipped classroom. *Journal of College Science Teaching, 42*(5), 62–66.

Inan, C. (2014). Developing a valid and reliable scale for measuring secondary education students' attitudes towards mathematics. *Turkish Studies -International Periodical For The Languages, Literature and History of Turkish or Turkic, 9*(12), 381–398.

Isman, A. (2005). *Ogretim teknolojileri ve materyal gelistirme.* Ankara, Turkey: PegemA Yayıncılık.

Kara, C. (2015). Flipped classroom. *Turkish Thoracic Society, 9*, 224–228.

Kaya, S. & Ozkes, B. (2015). Dondurulmus sınıf temelli ogrenme-ogretme yaklasımı. In G. Ekici (Ed.), *Etkinlik ornekleriyle guncel ogrenme-ogretme yaklasımları-III* (pp. 97–146). Ankara,Turkey: Pegem Akademi.

Kong, S. C. (2014). Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: an experience of practicing flipped classroom strategy. *Computers & Education, 78*, 160–173.

Miller, A. (2012, February 24). Five best practices for the flipped classroom. *Edutopia*. Retrieved March 17, 2017 from https://www.edutopia.org/blog/flipped-classroom-best-practices-andrew-miller

Moffett, J. & Mill, A. C. (2014). Evaluation of the flipped classroom approach in a veterinary professional skills course. *Advances in Medical Education and Practice, 13*, 415–425.

Mok, H. N. (2014). Teaching tip: the flipped classroom. *Journal of Information Systems Education, 25*(1), 7–11.

Moravec, M., Williams, A., Aguilar, R. N. & O'Dowd, D. K. (2010). Learn before lecture: a strategy that improves learning outcomes in a large introductory biology class. *CBE Life Science Education, 9*, 473–481.

Ozyurt, O. & Ozyurt, H. (2017). A qualitative study about enriching programming and algorithm teaching with flipped classroom approach. *Pegem Journal of Education and Instruction, 7*(2), 189–210

Seaman, G. & Gaines, N. (2013). Leveraging digital learning systems to flip classroom instruction. *Journal of Modern Teacher Quarterly, 1*, 25–27.

Sever, G. (2014). The application of flipped learning model on individual violin lessons. *Journal of Qualitative Research in Education, 2*(2), 27–42.

Talbert, R. (2012). Inverted classroom. *Colleagues*, *9*(1), 1–2.

Tan, E., Brainard, A. & Larkin, G. L. (2015). Acceptability of the flipped classroom approach for in-house teaching in emergency medicine. *Emergency Medicine Australasia, 27*, 453–459.

Tune, J. D., Sturek, M. & Basile, D. P. (2013). Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology. *Advances in Physiology Education, 37*, 316–320.

Turan, Z. & Goktas, Y. (2015). A new approach in higher education: the students' views on flipped classroom method. *Journal of Higher Education and Science, 5*(2), 156–164.

Wetterlund, K. (2009). Flipping the field trip: bringing the art museum to the classroom. *Theory Into Practice, 47*, 110–117.

Winter, J. B. (2013). *The effect of the flipped classroom model on achievement in an introductory college physics course* (Master's thesis). Mississippi State University, Starkville.

Wong, T. H., Ip, E. J., Lopes, I. & Rajagopalan, V. (2014). Pharmacy students' performance and perceptions in a flipped teaching pilot on cardiac arrhythmias. *American Journal Pharmaceutical Education, 78*, 185.

Yalın, H. I. (2003). *Ogretim teknolojileri ve materyal gelistirme.* Ankara, Turkey: Nobel Yayınları.

Zownorega, J. S. (2013). *Effectiveness of flipping the classroom in a honors level, mechanics-based physics class*(Master's thesis). Eastern Illinois University, Charleston.