

The Effectiveness of the Flipped Learning using the Smart Device

Su-Young Pi*, Suk-Jin Do**

Dept. of Institute of Liberal Education, Catholic University of Daegu*
College of Liberal Education, Dongguk University**

스마트 디바이스를 활용한 플립드 러닝의 효과에 관한 연구

피수영*, 도숙진**

대구가톨릭대학교 교양교육원, 동국대학교 교양학부**

Abstract With advances in technology, many researchers have made an effort to find out educational methods with customized instruction. The purpose of the research is to investigate i) if flipped learning is beneficial for the students taking intermediate-level English grammar and writing class compared with the traditional class, ii) if the flipped learning class is advantageous for all the score level students in terms of student achievement and iii) if the students feel motivated with the flipped learning class. T-test was utilized to determine any differences between pretest and posttest in student achievement. The result in terms of the academic achievement revealed that the flipped classroom approach for the low score group was found to be the least effective among others. In the case of flipped learning teaching method, the instructor should develop contents according to the level of learners. The development of customized contents tailored to the level of learners will enhance learners' learning achievement.

Key Words : Flipped Learning, Flipping the Classroom, Smart Learning, Clicker Program, Pingpong App

요 약 과학 기술의 발달과 더불어 학습자들에게 맞는 맞춤형 교수 방법을 찾기 위한 연구를 부단히 노력해 오고 있다. 그러한 교수법 중의 하나로써 많은 연구자들은 플립드 러닝 방식을 제시하고 있다. 이 논문의 목적은 플립드 러닝방식이 i) 전통적 교육방식 수업에 비해 학업 성취도 면에서 유용한지 ii) 학생들의 영어성적에 상관없이 모든 영어레벨의 학생에게 적용되어 질수 있는지 iii) 학습자들의 학습에 대한 동기유발을 일으키는데 도움이 되는 교수법인지를 알아보고자 한다. 학업성취에 있어서 플립드 러닝 수업을 받은 학생 그룹 중 가장 성적이 좋은 그룹 학생들은 학업에 있어 많은 향상을 보인 반면 학업 성적이 가장 낮은 그룹 학생들은 오히려 성적이 낮아지는 결과로 나타났다. 플립드 러닝 교수법으로 수업을 진행 할 시에는 학습자들의 수준에 따른 콘텐츠를 교수자가 개발해야한다고 본다. 학습자들의 수준에 맞는 맞춤형 콘텐츠 개발이 학습자들의 학습 성취도를 높일 것으로 본다.

주제어 : 플립드 러닝, 뒤집힌 교실, 스마트 러닝, 클릭어 프로그램, 핑퐁 앱

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Corresponding Author: Suk-Jin Do(Dongguk University)
Email: sjdosusan@naver.com

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1. Introduction

Switching from a traditional classroom to a flipped classroom can be daunting because of the lack of accessible, effective models for accomplishing it. However, effective flipped classroom helps the students personalize instruction. Personalizing instruction in order to maximize learning for the students usually includes identifying the needs and capabilities of individual learners. It makes instruction relevant and meaningful and provides flexibility in scheduling, assignments and pacing. Personalizing instruction generally means replacing traditional methods of education with customized instruction. Traditional classrooms cannot always provide personalized instruction, which has led some educators to recommend a blended learning environment[1,2,3], which incorporates technology in an effort to flip the classroom[4]. Recent advances in technology have pushed forward the change of education paradigm. Advances in technology made learning facilitate in a number of ways. Many educators are promoting both use of technology and some version of an inverted classroom often in a blended learning environment[5]. In today's sophisticated information society, foreign language learners can easily acquire various information about the target language that they want to learn online or offline[6].

The goal of this study is i) to determine if flipping the classroom is beneficial for the students taking intermediate-level English grammar and writing class compared with the traditional class, ii) to investigate if the flipped learning is advantageous for all the score level students in terms of student achievement and iii) to explore if the students feel motivated with the flipped learning class. In order to investigate the effect of flipped learning in terms of the students' academic achievement and their motivation to learn, the present study divided two classes into the controlled classroom and the experimental classroom. Especially for the

students' perceptions about the flipped classroom, the study carried out the survey. The questions are as follows : i) Did the flipped course affect the academic achievement? ii) How valuable was this flipped course? iii) Was the flipped course helpful for the motivation to learn? iv) Did you understand the learning content of the lesson before the class? v) Did you understand the learning content of the lesson before the class? The hypothesis of this study was based on the expectation that flipping the classroom would benefit student learning.

2. Related Works

2.1 Concept of a flipped classroom

The idea of flipping the classroom is not new. However, a lot of research relevant to flipping the classroom is only beginning to be published due to advances in technology and increased ubiquitous access to computers and other mobile devices[7,8,9]. Advances in technology allow teachers to provide online instructional videos and to benefit from online assessment systems. The idea of flipping the classroom with resources is simple. Rather than teacher providing synchronous in-class group instruction, students are expected to use the video resources provided, along with other materials, to learn concepts and complete tasks on their own at their own pace and at location convenient to the student[10]. This approach allows the teacher to use time in different ways such as adapting time allocation based on reports of where students need help.

There are a variety of ways that teachers implement a flipped classroom[11], but the concept is basically the same. The teacher's role as a course designer shifts somewhat from structuring in-classroom time to providing learning resources that can be consumed asynchronously as needed[12]. The flipping classroom is simply to replace after-lecture homework with the expectation that students study course material prior to

class. Certainly, teachers need to know how to best integrate technology into the learning process because how it is used matters.

2.2 Smart devices for flipped learning

Thanks to the technical advances, educators are also able to utilize a variety of instructional tools. In order to work on the flipped learning effectively, the instructors should provide not only the appropriate educational materials for the students but also need the good communication tool for the lecture[13,14]. The study chose the clicker program among others as a medium of the class. The clicker has many different apps such as Socrative, Pingpong, Symflow and Padlet. The first app as a communication tool the present study chose was a pingpong app. The pingpong has many advantages to use in class. First of all, it allows instructors to check out how much students understand the lecture, which led instructors to establish the proper educational strategy on the spot. It is also convenient for instructors to feed back about the answers the students submitted in class, which led the instructors to communicate with students efficiently[15,16].

The pingpong app also facilitates the check of attendance, quiz and the result of test during class, which improves learning efficiency. The other app the study chose as a communication tool was a band app. Using the band app, the instructors can post the video-based materials which the students should watch and study before class. With the band, students can watch videos that instructors posted and ask their instructors questions they do not understand while studying at home. These apps are useful devices to carry out flipped learning.

3. Methods

The research carried out the experiment with two different classes based on differentiated instructional

approaches (1) traditional instruction in the form of large-group classroom-based lectures (TG), and (2) technology-enabled independent study using textbook materials and videos with classroom support (FG). Here, TG is the controlled group and FG is the experimental group. Moreover, the traditional classroom was divided into the two different groups according to their English score after the pretest: high score group (TH) and low score group(TL) and the flipped classroom was also divided into the two different groups: high score group(FH) and low score group (FL) A T-test was used to determine the magnitude of any differences found between and within groups. Survey supplemented assessment data to help researchers better interpret and understand the results.

3.1 Research process

Participants in this research are undergraduate students taking the English grammar and writing class at K university in Kyungbook Province during the spring semester of 2016. The number of students in the traditional class is 26, 14 freshmen, 5 sophomores, 1 junior and 6 seniors. The flipped class has 24 students, 9 freshmen, 7 sophomores, 6 juniors and 2 seniors. In the traditional treatment, the teacher provides instruction in the classroom. Students were expected to come to class, listen to the presentations, and ask questions. Then before the next class, they completed homework tasks on their own in English grammar and writing. In the traditional approach, students mainly focus on both reviewing the textbook and watching videos given as supplemental material. On the other hand, in the flipped treatment, in addition to reading the textbook students could watch videos before the class to accomplish tasks. The video also provided motivation segments and additional instruction about how to think about the problem prior to the class. <Table 1> demonstrates the differences in treatments in the research. In the traditional approach, textbook and the form of paper are main lecture materials and

videos are added as a subsidiary material, which were used in the classroom. On the other hand, in the flipped approach, video-based lecture materials are crucial because the students should be ready for the class before the class. Paper materials are optional.

〈Table 1〉 Differences in treatments in the study

Treatment	Motivation & conceptual enrichment	Providing time for materials
TG	Paper and videos	During class
FG	Videos and Paper	Before class

3.2 Data collection and analysis

To answer the primary question regarding students' achievement, a T-test was used to identify any statistically significant differences. The pretest and posttest assessments were identical tests designed to assess student realization of the learning outcomes of the course. This test was the summative assessment that instructors from the regular classroom group typically gave to students upon completion of the course. The students in the traditional class and flipped class were required to take the pretest and posttest as it was a regular part of the instruction. The post-test survey will be used to answer the question of how students perceived the experience. In the survey students was asked to rate their perceptions about if the flipped course affected the academic achievement, how valuable the flipped course was, if the flipped course was helpful for the motivation to learn, if the flipped course was effective for the self-directed and how much they understood the learning content of the lesson before the class. Differences in response distributions were compared using a T-test.

4. Results

4.1 students' academic achievement

In order to explore the effect of the flipped learning, the study conducted the experiment with two different

classes according to differentiated instructional approaches: traditional classroom (controlled group) and flipped learning classroom (experimental group). The subjects are 50 students of K university in Kyungbook Province.

〈Table 2〉 Percentage for each group

Group	High level	Low level
TG	11	15
	42%	58%
FG	10	14
	42%	58%

The experiment lasted for 15 weeks. The class consisted of two different 75 minutes a week. At the first day, the pretest was carried out for both the experimental class and the controlled class. The study especially explained how the students in flipped learning classroom should prepare the class before the class. The first posttest was carried out at the 7 th week and the second posttest test and the survey were conducted at the 15th week. Prior to the research, Group similarities based on independence, normality and homogeneity were tested and found to be adequate for using this procedure. The <Table 3> showed the result. First of all, in order to examine how TG and FG group students improved academically, the study carried out pretest and posttest.

〈Table 3〉 Homogeneity test between instruction types

Group	M	SD	t	p
FG	22.71	5.052	-.356	.723
TG	23.15	3.608		

The <Table 4> shows that test scores did improve significantly from pretest to posttest for traditional group ($p < 0.000$), whereas scores from flipped group did rather decrease from 22.71 to 21.88 ($P < 0.000$). The study checked the difference of the pretest and posttest scores between FH and FL group.

<Table 4> Pretest and posttest by each group

	grade	Mean	Std	t	Pro
Controlled group (TG)	pre	23.15	3.608	1.202	0.000
	post	25.19	3.086		
Experimental group (FG)	pre	22.71	5.052	-4.890	0.000
	post	21.88	7.201		

Test scores were significantly different respectively ($p < 0.006$, $P < 0.000$) from pretest to posttest for FH and FL group. Test scores for FH group did improved from 27.20 to 29.0, but those for FL group did decrease from 19.50 to 16.79 in <Table 5>.

<Table 5> Pretest and posttest by Flipped groups

	grade	Mean	Std	t	Pro
Pre	FH	27.20	1.932	5.618	0.006
	FL	19.50	3.995		
Post	FH	29.0	0.667	7.707	0.000
	FL	16.79	4.949		

It means that flipped classroom did not impact FL group students but FH group significantly in terms of academic achievement and FL group was responsible for the score decrease of FG group from pretest to posttest. The study compared the score difference from pretest and posttest between FH and TH group. <Table 6> displayed that test scores improved from pretest and posttest for both FH and TH groups. While pretest scores for the FH group were slightly higher than those of the FL group, posttest scores for the FH group were much higher than those of FL group.

<Table 6> Pretest and posttest results by high groups

	grade	Mean	Std	t	pro
Pre	FH	27.20	1.932	5.393	0.000
	TH	26.27	2.796		
Post	FH	29.00	0.667	4.641	0.000
	TH	27.55	1.809		

When it comes to test scores for low groups, both FL and TL groups showed significantly different test scores from pretest to posttest in <Table 7>. While

pretest scores for the TL group were slightly higher than those of the FL group, posttest scores for the TL group were much higher than those of FL group. TL group improved 2.6 points from pretest to posttest, whereas FL group rather decreased 2.7 points from pretest to posttest.

<Table 7> Pretest and posttest results by low groups

	grade	Mean	Std	t	Pro
Pre	FL	19.50	3.995	-1.141	0.005
	TL	20.87	2.10		
Post	FL	16.79	4.949	-4.569	0.013
	TL	23.47	2.669		

A <Table 6> and <Table 7> demonstrated, test scores for each group were significantly different from pretest to posttest. T-test was carried out to verify the difference between pretest and posttest scores. The result showed that test scores from pretest to posttest were significantly different ($p < 0.000$).

<Table 8> Posttest verification by instruction type

Group		M	SD	t	p
FG	FH	29.0	7.201	-2.147	0.000
	FL	16.79			
TG	TH	27.55	3.086		
	TL	23.47			

4.2 Students' perception on flipped learning

The survey was conducted to examine students' perception about flipped learning on the 15th week to the twenty four students in FG. The reliability of the survey demonstrated 76% and the alpha value is 0.759. An analysis of the survey confirms that students in FL group were less likely to feel they had learned a lot from the course. Over 80% of the students from FH group marked strongly agree or very agree to indicate that they had learned a lot, compared to only 64.3% from FL group who indicated these responses. Based on results from the posttest survey for this study, students in FH were much more likely to feel the

class(70%) was extremely valuable compared with students in FL group(50%). Students in FH had tendency to consider the flipped learning effective for the self-directed learning(80%) compared with students in FL group(42.9%). And also students in the FH group more understood the learning content of the lesson before the class (70%) than students in FL group(42.9%).

〈Table 9〉 The results of the survey on flipped learning

Num	Contents	Percent		
		Total	FH	FL
1	Did the flipped course affect the academic achievement?	70.8%	80% (8/10)	64.3% (9/14)
2	How valuable was this flipped course?	58.3%	70% (7/10)	50% (7/14)
3	Was the flipped course helpful for the motivation to learn ?	66.7%	80% (8/10)	57.1% (8/14)
4	Was the flipped course effective for the self-directed learning ?	58.3%	80% (8/10)	42.9% (6/14)
5	Did you understand the learning content of the lesson before the class?	54.2%	70% (7/10)	42.9% (6/14)

5. Conclusion and Discussion

The research investigated what benefit flipping the classroom might have for the students taking a college course for intermediate level English grammar and writing. The criteria for evaluating the traditional approach and flipped learning approach included both academic achievement and student perception data regarding the value of various learning experiences provided. In terms of the academic achievement, the result showed that the flipped classroom approach was found to be the most effective for the FH group comparing with other groups. However, this approach did not impact the FL group, whose scores are rather lower than TH and TL groups. When it comes to the students' perception about the flipped learning, FH group demonstrated the most satisfaction for the course, but the FL group showed the contrast result. In

other word, the students in FH group showed the positive answers on academic achievement, motivation to learn and the effect for the self-directed learning, while those in FL group found the flipping classroom unhelpful for their English achievement, motivation to learn and effect for self-directed learning. In conclusion, the flipping classroom is beneficial for high level students (FH), but not for the low level students like FL group. The students in the FL group were less likely to concentrate on the lesson. On the other hand, the students in the FH group involved in the class more voluntarily.

This seems to be the result of lack of content that meets the learners' level of learning. To improve the result of FL group, at first, instructors should develop various contents according to the level of learners when conducting the class by flip learning method. The development of customized content tailored to the level of learners will enhance learners' learning achievement. At second, in order to increase the effectiveness of the pre-learning for FL group, it is necessary for the learner to study through the various contents written by the professor and to write the questions in advance. This will enable students to experience the amazing effects of flip learning-based learning with active discussions in class. At last, instructors should improve the teaching - learning environment which makes the learners involve more voluntarily in class. The better teaching-learning environment is expected to enhance students' academic achievement as well as self-directed learning ability.

REFERENCES

- [1] S. I. Park, S. E. Lee & J. E. Song, "Major Factors Influencing Effective On/offline Learning on the Blended Learning in Higher Education", The Journal of Korean Society of Yeolin Education, Vol. 15, No. 1, pp. 17-45, 2007.

- [2] N. S. Seo, S. J. Woo & Y. J. Ha, "The Effects of Self-directed Learning Ability and Motivation on Learning Satisfaction of Nursing Students in Convergence Blended Learning Environment", *Journal of Digital Convergence*, Vol. 13, No. 9, pp. 11-19, 2015.
- [3] K. H. Bae, "A Study on Development and Application of Cooperative Learning Model for Interdisciplinary Approach in Curriculum Development", *The Journal of Korean society for educational technology*, Vol. 28, No. 4, pp. 907-924, 2012.
- [4] J. Bergmann, A. Sams, "Flip Your Classroom: Reach Every Student in Every Class Every Day", *International Society for Technology in Education*, 2012.
- [5] S. Y. Pi, M. S. Lee, "Developing a Convergent Class Model of Augmented Reality and Art", *Journal of Digital Convergence*, Vol. 14, No. 5, pp. 85-93, 2016.
- [6] J. I. Yi, J. S. Han, "A study on developing a Learning material Screening system for improving foreign language learning efficiency", *Journal of Convergence Society for SMB*, Vol. 7, No. 1, pp. 87-92, 2017.
- [7] D. Y. Lee, "Research on Developing Instructional Design Models for Flipped Learning", *Journal of Digital Convergence*, Vol. 11, No. 12, pp. 83-92, 2014.
- [8] D. Y. Lee, J. H. Park, "Exploring new directions of flipped Learning with a focus on teachers' perceptions", *Journal of Digital Convergence*, Vol. 14, No. 8, pp. 1-9, 2016.
- [9] S. J. Heo, "Learning Effect Analysis for Flipped Learning based Computer Use Instruction", *Journal of the Korea Convergence Society*, Vol. 8. No. 1, pp. 155-162, 2017.
- [10] Y. J. Park, "A Theoretical Exploration of Pedagogical Meaning of Flipped Learning from the Perspective of Dialogism", *Journal of the Korea Convergence Society*, Vol. 8. No. 1, pp. 173-179, 2017.
- [11] H. Hughes, "Introduction to Flipping the College Classroom", *Proceedings from world Conference on Educational Multimedia, Hypermedia and Telecommunications*, pp. 2434-2438, 2012.
- [12] J. Y. Lee, S. H. Park, H. J. Kang, S. Y. Park, "An Exploratory Study on Educational Significance and Environment of Flipped Learning", *Journal of Digital Convergence*, Vol. 12, No. 9, pp. 313-323, 2014.
- [13] I. A. Kim, B. R. Lim, J. Y. Park, "Exploring the Theoretical Framework and Teaching & Learning Strategies of Smart Learning: Using Cases of University Classrooms", *The Journal of Korean Association For Educational Methodology*, Vol. 24, No. 2, pp. 283-303, 2012.
- [14] S. H. Choi, "A Study on Smart Campus Information Services", *Journal of Convergence Society for SMB*, Vol. 6, No. 3, pp. 79-83, 2016.
- [15] S. Y. Pi, "Educational Utilization of Smart Devices in the Convergence Education Era", *Journal of Digital Convergence*, Vol. 13, No. 6, pp. 29-37, 2015.
- [16] Y. H. Lee, H. J. Cho & J. H. Lee, "Implementation of Educational Service for Environmental Saver using Smart Device", *Journal of Digital Convergence*, Vol. 13, No. 5, pp. 1-8, 2015.

Pi, Su Young(피수영)



- 2004년 8월 : 대구가톨릭대학교 전산 통계학과(이학박사)
- 2012년 3월 ~ 현재 : 대구가톨릭대학교 교양교육원 교수
- 관심분야 : 소셜마케팅, 스마트교육, IT융합, 교육콘텐츠
- E-Mail : agnes3699@cu.ac.kr

Do, Suk Jin(도숙진)



- 2004년 3월 : 경북대학교 영어학(문학박사)
- 2016년 9월 ~ 현재 : 경주 동국대학교 파라미타 칼리지 교수
- 관심분야 : 스마트러닝, 교육콘텐츠
- E-Mail : sjdosusan@naver.com