'The Flipped Learning' : Research on the Development of a Hybrid Instructional Model

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A B S T R A C T

Using recent advanced information technologies, a "flipped learning" instructional model was developed for this study to enhance the effectiveness and efficiency of instruction. A flipped learning generally refers to a hybrid learning environment where learners learn online at home and conduct academic activities in the classroom or a physical place. In order to develop an instructional model, development principles, component, and contents were investigated. By the participation of three experts on the subject for comments and feedback and a pilot study for eight weeks, the validity was examined for model elaboration. As a result, the 8C instructional model for on- and off-line learning are presented: construction, connection, communication, coordination, confirmation, clarification, collaboration and completion. Based on the structured flipped learning instructional model, specific strategies are expected by further empirical research.

1. Introduction

Directive teaching has been one of the most frequently used instructional methods for in class learning environments. Using this method, instructors or teachers can give lectures directly to learners or students for knowledge acquisition. However, this has some limitations in that the learning content is decided by the instructor and tends to be delivered in a unilateral way from the instructor to the learner

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[1]. Accordingly, instructor-learner interactions and learner participation are structurally restricted.

Recent eLearning development has potential for addressing the limitations of traditional teaching methods. The advancement of information technologies has enabled learning content to be saved in a specific spot online and to be retrieved anytime, anywhere, as needed. Therefore, students do not necessarily sit down in the classroom to passively listen to lessons. In this situation, traditional ways of learning can be "flipped" in a new instructional paradigm: the flipped classroom [2, 3].

Flipping the class refers to the role of the traditional learning setting is flipped: Learners take lessons online at home, which used to be done in person in the classroom, and perform various activities in the classroom to deepen their knowledge, which also used to be done as homework.

The flipped learning can be an innovative catalyst for improving instruction. Therefore, this study aims to develop a concrete instructional strategy that the instructor and the learner can easily follow to maximize the effectiveness of the flipped learning.

2. Theoretical Background

2.1 Advancement of Information Technology

Rapid development of information technologies has made people's lives change drastically. Things that were considered the work of the distant future have become a reality in recent years. The use of the Internet with smartphones and tablet PCs are now ubiquitous. In addition, personal cloud, the Internet of things, and integrated ecosystems are parts of the state-of-the-art technology trends that are changing lifestyles and work methods [4].

Another point worth noting is that information technology is in everyday use. Internet penetration rates have drastically increased in recent years. International Telecommunications Union (ITU) announced 77.7% of the households in developed countries were estimated to use the Internet in 2013 [5].
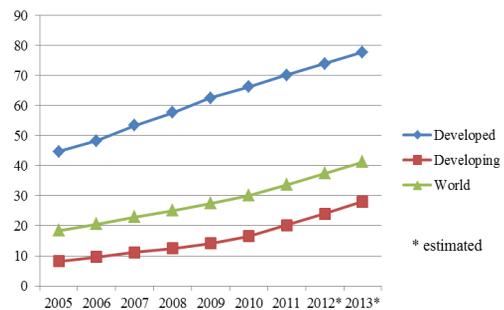

그림 1. 거주 100인당 인터넷 사용자
Figure 1. Internet users per 100 inhabitants

As noted in <Figure 1>, the proportion of people in developing countries who are Internet users has also increased, from 8.1% to 28% within the past eight years. The global average was 41.3% as of 2013.

2.2 The flipped learning

A flipped learning can be defined as a hybrid

learning method that uses digital technologies for delivering instruction online and moves homework into the classroom so a teacher can spend more time interacting with students instead of lecturing [6, 7]. In a flipped classroom environment, students learn academic content online by watching video lectures on computers or smart devices, usually at home, and what used to be homework is done in class with the instructor offering more personalized guidance and facilitating student learning, instead of lecturing [2].

Baker introduced the model of classroom with the catchphrase "Sage on the stage to the guide by the side" [2, 3]. These days, various expressions such as "flipped learning," "flipped teaching," "backwards classroom," "reverse instruction," and "reverse teaching" may be used interchangeably with "flipped classroom"[6].

<Table 1> indicates the characteristics of the traditional directive teaching classroom compared to those of the flipped learning.

표 1. 전통적 수업모형 vs. 전환 수업모형 비교
Table 1. Traditional vs. flipped learning

Index	Traditional Learning	Flipped Learning
School	Offline lecture	Classroom activities
Home	Homework	Online lecture

By the way, the flipped learning is a sort of blended learning where online and offline classes are mixed. However, blended learning initially make an emphasis of offline classes to make up for the weak points of online learning, the flipped learning originally distinguish the role of online from that of offline.

The latest computer technology has created favorable environments for flipped learning. However, research on how to use flipped classroom strategies in real settings is hard to find. Therefore, this study was conducted to develop practical instructional strategies to help instructors and learners use the flipped learning method in on- and off-line learning environments.

3. Development Process

3.1 Principles

In order to construct the flipped learning instructional model, development principles were elaborated. First for the principles was to set a theoretical background. Among a lot of instructional theories, the optimal theory that fits best to the study needed to be selected to lead overall stance of the principles. Second, fundamental elements were considered. The elements should help decide what and how to learn in flipped learning environments. Third was core methods which could offer specific strategies that would apply to the instruction. Last was supportive tools. In this stage, required technical supports were identified to practice designed instructional activities.

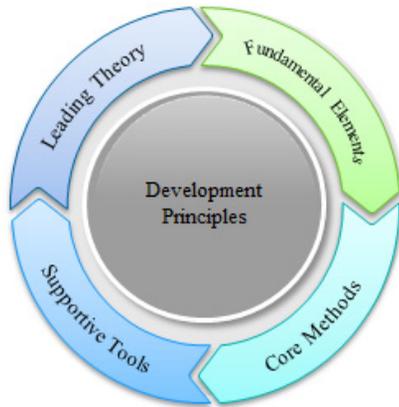All of the four principles were connected each other in a systemic way.

그림 2. 모형 개발원리
Figure 2. Development principles of the model

3.2 Components and contents

Based on the four principles, the components of the principles and specific contents were driven.

3.2.1 Learning Theory

Regarding learning theory, the paradigm has recently shifted from behaviorism and congnitivism to constructivism. constructivism assumes that knowledge is continuously constructed and reconstructed according to the characteristics of social and cultural background of the learner. Active process of knowledge construction is important during learning [8]. In constructivism, learners are expected to address meaningful learning tasks in a self-regulated way with the help of the instructor who play a role as a facilitator [9].

Also, learning environments should be contextual and complex [10]. In this setting, learners collaborate with other learner and socially construct knowledge.

By the way, constructivism can be divided into two philosophical grounds: cognitive and social constructivism. Cognitive constructivism has an emphasis on individual's process of cognitive operation and social constructivism focuses on interactions by learners' social relationships [8]. The major figure of the flipped learning where leaners voluntarily participate in academic activities to construct knowledge in collaborative environments fits to the ideals of constructivism.

Therefore, constructivism was applied to theoretical background and basic academic conditions of the flipped learning.

3.2.2 Fundamental elements

In order to develop instructional model for the flipped learning, fundamental elements should be found and defined. Among them, events of learning activities should be considered. Based on the time flow of the flipped classroom learning activity, it is required to define each event of learning activity according to the systematic methods of the flipped learning. The first activity will be individual learning at home with working on the contents using the computer. Next flow includes acquire additional and supportive information from internet searching activities. Learners are expected to navigate and select relevant information among rich resources on the Internet. In online settings, learners can communicate with peers to acquire advanced and further information in a specific learning

community. Also, the instructor's role is to intervene and facilitate learning by correcting, managing, controlling learners' online activities with other learners [11].

Second is the instructional patterns. The patterns are closely related to the events of learning activities. Individual learning and online resource usages are done online and collaborative work and further activities are done offline. Another pattern that could be considered is individual learning and collaborative group work.

or debating issues online before; to solve problems raised by the instructor in collaborative environments; and to complete the class sharing collective intelligence.

3.2.3 Core methods

The first methods that should be applied is interactivity. Social constructivism other than behavioristic or cognitive approach emphasizes interactivity for constructing knowledge.

표 2. 교수학습모형 개발 원리, 요소 및 내용

Table 2. Principles, components, and contents of the instructional model

Principles	Components	Contents
Leading Theory	individual constructivism	· knowledge absorption using internet resources & learning materials · Opportunities for deepen knowledge
	Social constructivism	· Communication with others by Q&A and comments
Fundamental Elements	Learning activities	· Individual learning, collaborative work, Instructor's intervention
	Instructional Patterns	· Online to offline · Mixture of individual tasks and group activities
	Behavior	· acquiring knowledge, using Internet resources, raising questions and making comments, synthesizing information, reviewing online activity, addressing issues online, problem solving, completing collective intelligence
Core Methods	Interactivity	· Facilitation of instructor-learner, learner-learner interactivity · Use of social network
	Web 2.0	· sharing, collaboration, participation
Supportive Tools	The Internet	· online activities
	Social network	· communication tools

By the way, descriptions of the behavior as a result of learning is important. Expected behaviors in chronological order in the flipped classroom learning are as follows: to acquire knowledge by online learning; to seek for the Internet for rich learning resources; to raise questions and make comments on online communities; to synthesize information gathered; to review online activities by the help of the instructor; to address unsolved

Interactivity come from between the instructor and the learner as well as among learners. They ask questions, answer other learners, make comments to facilitate build knowledge. All of these activities can be done both online using social networks and offline in person.

3.2.4. Supportive tools

It is imperative for learners to use the Internet for flipping the classroom. Because the need to learn with online resources to acquire knowledge before the physically gather together for further activities, Internet connection is essential. Also, communication tools such as social network services (SNSs) are important for both the instructor and the learner to communicate each other online. By using communication tools, crucial learning activities for exchanging and deepening knowledge can be achieved.

The 25 contents based on 4 principles and 9 components were re-distributed by common denominators. The researchers of the study classified all of the contents into similar activities. As a result, a total of eight units were constructed, which contained a sum of each unit of instructional activity respectively. As seen in <Figure 3>, the eight units are linked to the 25 contents. For instance, the first "Unit" included "knowledge absorption" under the individual constructivist theory, "individual learning", "online", "individual task", "acquiring knowledge".

3.3 Model Building

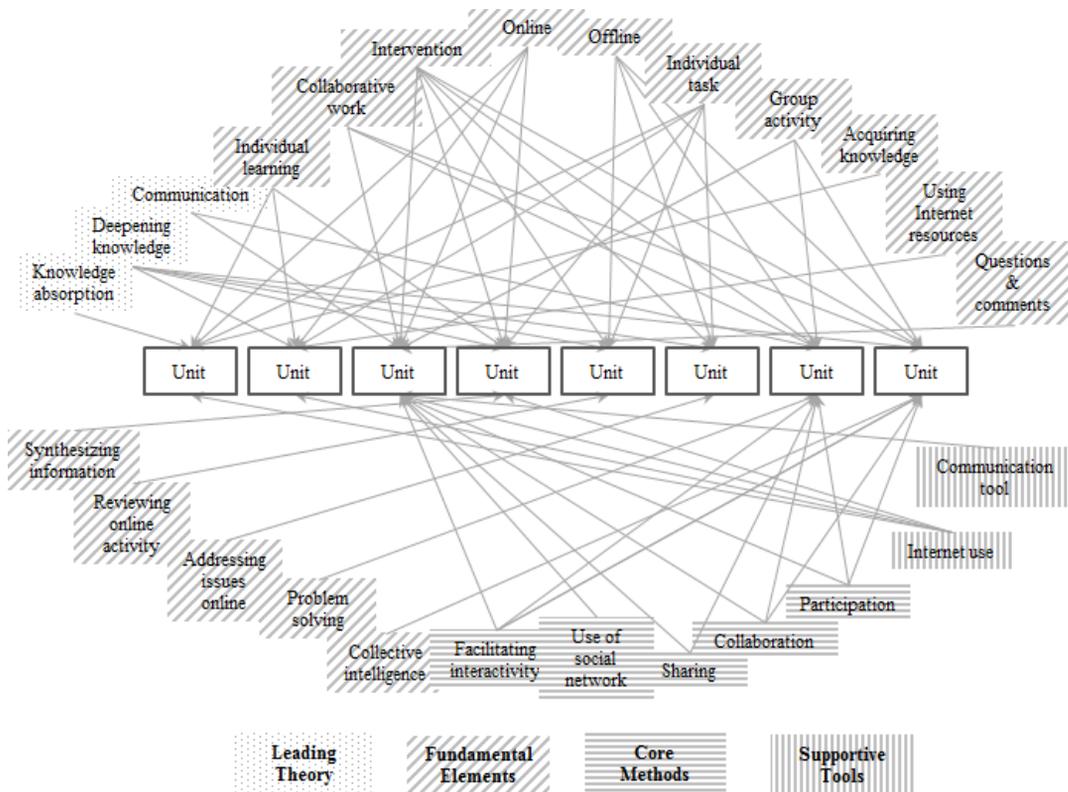
그림 3. 모델구축과정
Figure 3. Modeling building process

The researchers of the study, then, figured out representative term that symbolize the characteristics of the stages.

4. Validity Tests

In order to test the validity of the model, a total of three experts on instruction and educational technology participated in the model building process to give comments and feedback to improve and complete the model.

Another method to check the validity was the pilot study. In the Fall semester of 2013, the model was examined in a learning setting. In K University located in Seoul, seven students participated in the flipped classroom learning

activity in "recent educational technology trends" class for eight weeks. Through the period, the validity of the components and contents based on the principles was repeatedly examined. The participants watched videos online at their home and the instructor led classes for further activities offline. Learning contents used for the study were "Instructional Ideas and Technology Tools for Online Success" from a Massive Open Online Course(coursesites.com). During the eight weeks, units of the learning process were developed based on the framework in Figure 4 and Table 3 for the final model of the flipped learning.

5. Instructional Model: 8C Model

Based on the model development process, a hybrid instructional model was developed for both the instructor and the learner to effectively teach and learn with proper support through the Internet and technology. The term "hybrid" includes both on- and off-line activities conducted in the learning process. The developed model has a total of eight major instructional activities: Construction, Connection, Communication, Coordination, Confirmation, Clarification, Collaboration, and Completion. The first four are performed online, while the others are offline tasks.

5.1 Construction

"Construction" is the first step of the model. Construction here signifies constructing knowledge and information. The learner begins learning by visiting a guided website that offers learning content. Learning content can be created by the teacher or chosen from Internet websites that provide free video clips of fine quality on a variety of academic topics; Khan Academy, Coursera, and Udacity are prominent among these sites. Besides video clips, the instructor can offer readings or materials that the learner studies in a self-regulated way. Under the constructivist methods, the learner constructs knowledge, creating his/her unique experiences from learning contexts.

5.2 Connection

With an abundance of Internet resources, the learner can enhance his/her scope of knowledge. After or during learning online materials provided by the instructor in the "Construction stage", the

learner is guided to explore related online resources that help to comprehend the topic in depth. Therefore, this stage focuses on connecting the learner with relevant and supplementary information. By connecting with various learning content, the learner can explore learning topics from different perspectives.

5.3 Communication

Leaners online are not alone. By using appropriate software, they can communicate with peers. For example, learners post messages on a SNS or a discussion board to ask and answer questions, exchange opinions, and acquire useful information. To activate the communication process, the instructor or institution should provide online space for the learner in advance. Then learners can begin sharing ideas with each other to better understand content knowledge.

5.4 Coordination

In the "Coordination" stage, the instructor
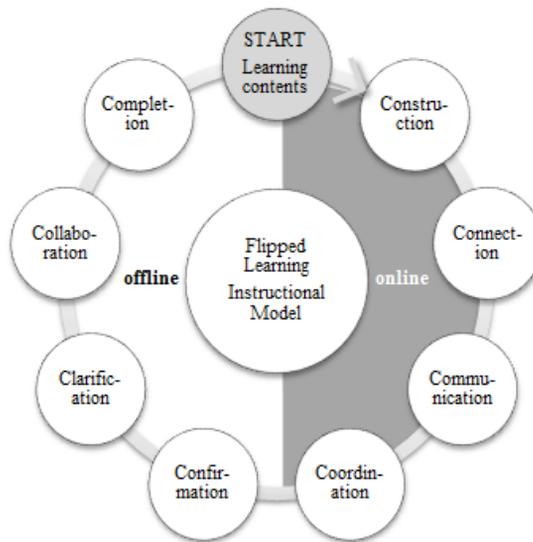

그림 4. 8C 모형
Figure 4. 8C model

표 3. 8C 모형 주요 교수학습활동
Table 3. Key activities of the 8C model

Strategy	Key Activity	Strategy	Key Activity
Construction	Knowledge acquisition	Confirmation	reviewing online activities
Connection	Use of Internet resources	Clarification	Addressing online issues
Communication	Questions & comments	Collaboration	Problem solving
Coordination	Synthesizing information	Completion	Collective intelligence

meticulously coordinates online activities to improve the quality of learning. The instructor helps learners find the proper online resources, reminds learners of their tasks, manages each learning process, etc. Also, the instructor coordinates learners' postings on the SNS at the "Communication" stage in a way that leads to productive discussions, gives argument guidelines, or intervenes at critical points.

5.5 Confirmation

"Confirmation" is the first stage of offline activities. After learning from online resources and participating in discussions with others, learners meet in person in the classroom. In the "Confirmation" stage, learners encounter physical entities such as the instructor, peers, and even (printed) learning materials. The instructor formally confirms the learning objectives and content again, which reinforces learners' motivation as well. The process of confirmation includes giving mini-lessons and asking some learners to explain what they have previously learned online.

5.6 Clarification

The instructor can bring up topics that were complicated or debated online again to clarify them. The instructor can also elicit additional questions and related comments from learners.

Ambiguous or difficult learning content is clarified at this stage. Answers can be provided directly by the instructor or proposed by the learners. Therefore, both the instructor and the learners are expected to make an effort to clarify issues raised in online learning sessions.

5.7 Collaboration

Since the instructor and the learners are physically gathered in the same place together, specific activities can be performed in order to

optimize the occurrence. For instance, the instructor could allow learners to do collaborative activities to address tasks in a Problem Based Learning (PBL) style. Additionally, cooperative learning strategies can be applied to enhance learners' academic and social experiences in a structured positive interdependence environment [12].

5.8 Completion

In this stage, learners complete learning activities. From online to offline activities, the learners' knowledge is completed. Also, the emphasis is on the learning community as a whole's reaching the academic goal of the lesson, not on individual achievement. In other words, learners achieve the level of collective intelligence after completing the learning process. Collective intelligence is shared or group intelligence that emerges from the collaboration, collective efforts, and competition of individuals and appears in consensus decision-making [13].

6. Conclusions and suggestions

Information technology is one of the tools that can incite progress in human life. Similarly, in education, information technology can play an important role in changing stereotypical instructional methods that have become commonplace. It is now possible to conduct flipped learning because of the advancement of technology. In a "flipped" environment, instructors and learners can create entirely new teaching and learning strategies including acquiring knowledge online, using plentiful learning resources, communicating with peers anytime anywhere, collaborative group activities and gaining collective intelligence. The instructor no longer needs to spend time on repeating the same content to different learners. Additionally, the learner receives academic support and advice from the instructor throughout the learning process.

The 8C model developed in the study aimed to help conduct flipped learning more easily in a systemic way. The sequential on- and off-line activities are intimately linked to each other: Construction, Connection, Communication, Coordination, Confirmation, Clarification, Collaboration, and Completion.

As suggestions, learning activities in reality does not need to stick to eight steps of the study. The instructor and the learner modify and improve according to their own learning environments. Some activities could be added or skipped if needed. Finally, the 8C model should be experimentally tested to examine its reliability and validity for further improvement.

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'전환수업(Flipped Learning)': 혼합 교수학습모형 개발연구

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요 약

본 연구는 최신의 IT 발달에 근거하여 이를 적극 활용하는 이른바 "전환수업(flipped learning)" 교수학습모형을 개발함으로써 보다 효과적이고 효율적인 학습결과를 달성하고자 수행되었다. 전환수업이란 일반적으로 학습자들이 가정에서 온라인을 통해 사전에 지식과 정보를 학습하고, 학교 또는 특정한 물리적 장소에서 각종 학습활동을 실시하는 혼합학습 방식을 일컫는다. 교수학습모형 개발을 위해 개발의 원리를 비롯하여, 요소 및 내용들을 우선 도출하였다. 이들의 타당성 검증 및 모형개선을 위해 해당분야 전문가 3인의 조언과 피드백 과정을 거쳤으며, 8주에 걸친 예비조사 과정을 거쳐 모형을 정교화하였다. 연구결과 개발된 8C 교수학습모형은 다음과 같다: "구성 (construction)", "연결(connection)", "소통 (communication)", "조정(coordination)", "확증 (confirmation)", "명료화(clarification)", "협업 (collaboration)", "완성(completion)". 본 전환수업 교수학습모형에 기반하여 추후 경험연구를 통한 구체적인 전략들의 축적이 기대된다.

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