

Visualizing the ICT-Assisted Flipped Pedagogical Approach in EFL Education

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ABSTRACT

It is necessary to systematically review the literature since the information and communication technology (ICT)-assisted flipped pedagogical approach in English education has been increasingly popular. By way of visualization through CiteSpace and other qualitative research methods, the authors arrived at the conclusion that most of the studies support the ICT-assisted flipped pedagogical approach in EFL education although there are still some different findings. The flipped classroom pedagogy in EFL education may bring many advantages to students, teachers, and researchers. Disadvantages of the ICT-assisted flipped pedagogical approach include difficulty in supervising students' learning activities, organization of in-class academic activities, cautious attitudes, and some negative learning outcomes. They also explored the number of recent publications and citations, co-citation clusters of the cited literature, citation counts, and rankings by bursts, centrality, and sigma. Future research may focus on the interdisciplinary research into the ICT-assisted flipped pedagogical approach.

KEYWORDS

CiteSpace, EFL Education, Flipped Approach, ICT, Lecturing Videos

INTRODUCTION

A flipped classroom has been deemed as a rising pedagogical approach that integrates lecturing videos into students' self-regulated learning out of class through reviewing the learned contents or preview what will be learned before class (DeLozier & Rhodes, 2017; Yu, 2019). In the flipped classroom, the delivered contents in a traditional classroom are moved out of class and shown to learners through information and communication technology (ICT) assisted tools, e.g. mobile applications. The in-class delivery in a traditional classroom is replaced with dynamic and collaborative learning activities (Abeysekera and Dawson, 2014).

The ICT assisted flipped pedagogical approach included the integration of ICT into learning and teaching process (Al-Zahrani, 2015). An increasing number of scholars have recently been paying much attention to the role the information technology plays in learning and teaching. Recent work has shed light on how to integrate ICT into teaching and learning. Under the flipped classroom model, students could also have convenient access to extracurricular contents through ICT.

The ICT assisted flipped pedagogical approach has caught much attention due to its success in education. Its effectiveness and efficiency in EFL learning and teaching have, however, not been immensely explored and discussed. It is thus necessary to go through the literature to find out the missing links in studies on the flipped classroom especially in EFL language learning and teaching fields.

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Although there have been some reviews on the ICT assisted flipped pedagogical approach, a large number of aspects of the flipped approach have not been discussed in EFL language learning and teaching. For example, in EFL language flipped approach, there is a strong potential for using ICT in the flipped classroom due to a number of features of ICT well suited for preparations out of class in the flipped approach. Despite the advantages of the flipped approach in EFL language learning have been frequently explored, a systematic analysis of them has rarely been touched on, let alone the disadvantages in the flipped EFL language classroom. The supervision over students out of class may be a headache to teachers and teaching designers. How to prepare the in-class learning activities may cost teachers' a huge amount of time, which may lead teachers to resist against this flipped approach. Use of ICT in the flipped approach will definitely require financial investment, which raises an unavoidable question: is the ICT assisted flipped pedagogical approach in EFL education feasible? These questions have been rarely synthesized especially in the field of EFL language pedagogy.

Based on the above description and literature, we therefore raised four research questions: (1) What is the status quo of the ICT assisted flipped pedagogical approach in EFL education? (2) What is the number of recent publications and citations, co-citation clusters of the cited literature, citation counts, and rankings by bursts, centrality, and sigma in the ICT assisted flipped pedagogical approach in EFL education? (3) What are the advantages of the ICT assisted flipped pedagogical approach in EFL education? (4) What are the disadvantages of the ICT assisted flipped pedagogical approach in EFL education?

RESEARCH METHODS

This methodology part will introduce the procedure of data collection, as well as the theoretical framework of this study.

Data Collection Procedure

Guided by the recommendations and methods in Han (2014), we adopted a synthesized literature review method through obtaining data from the online database "Web of Science". We retrieved in total 1,515 articles and 6,112 citations by searching the database using the combinations of the key words or titles such as "flipped classroom" OR "flipped class" OR "inverted classroom" OR "inverted class" AND "EFL" AND "Information and communication technology" AND "e-learning" OR "flipped pedagogy" ranging from the year 1900 to 2018.

After retrieving the papers, we selected the literature based on the following criteria: (1) The selected papers should be published in peer-reviewed journals ranging from the year 1986 to 2018; (2) The selected papers should explore the ICT assisted flipped pedagogical approach in EFL education rather than other fields; (3) The selected papers should adopt a rigid design and arrive at convincing results through reliable data and valid instruments; (4) The conference proceedings and nonacademic reports were not included. According to the selection criteria, we finally obtained approximately 30 results, based on which the research questions were answered and analyzed.

The Theoretical Framework of This Study

The flipped approach may be able to enhance students' engagement in EFL language learning in that the in-class contents are moved out of class, where students may learn at the time or place when or where they feel convenient. The preview before class may help students cultivate systematic schema in their brain which will encourage them to participate in learning activities and deepen their perception of linguistic knowledge.

The Presage, Process, and Product factors (3P) model (Biggs, 2003) was adopted to guide the procedure of this research. The 3P model has been evidenced valid and reliable to be applied to all academic disciplines across the world (Biggs, 2003). There are three reasons for use of 3P model as a theoretical framework. Firstly, the 3P model can be used to identify the relationship between the ICT assisted flipped pedagogical approach and EFL language learning and teaching effectiveness.

Furthermore, the 3P model is appropriate for the context-based research, which is beneficial to the understanding of the effectiveness in the flipped EFL classroom context. Finally, the 3P model can be used to easily identify the relationship between or among the constructs, revealing the nature of the relationships and provide a scenario of the interactions among constructs in the flipped EFL classroom.

Presage factors refer to the individual features of either students or teachers that influence or are influenced by the process and product factors. Student presage factors refer to each student's initial EFL language knowledge, cognitive load, satisfaction or motivation factors. Teacher presage factors, e.g. flipped pedagogy, and teaching contents, may influence student presage factors and learning performances.

Process factors in this study refer to the flipped EFL learning and teaching process, as well as the interaction between learning and teaching methods. This factor focuses on the ICT assisted flipped pedagogical approach and the students' participation in this approach.

Product factors refer to the academic achievements that are resulted from the interactions between presage and process factors. In this study, the change of EFL language skills is the "product factor" that is influenced by the "presage factor" (students' initial EFL language knowledge and related factors) and "process factor" (the ICT assisted flipped pedagogical approach).

Findings

This part, as a major section of this study, will present the main findings according to the sequence of research questions.

The Status Quo of the ICT Assisted Flipped Pedagogical Approach

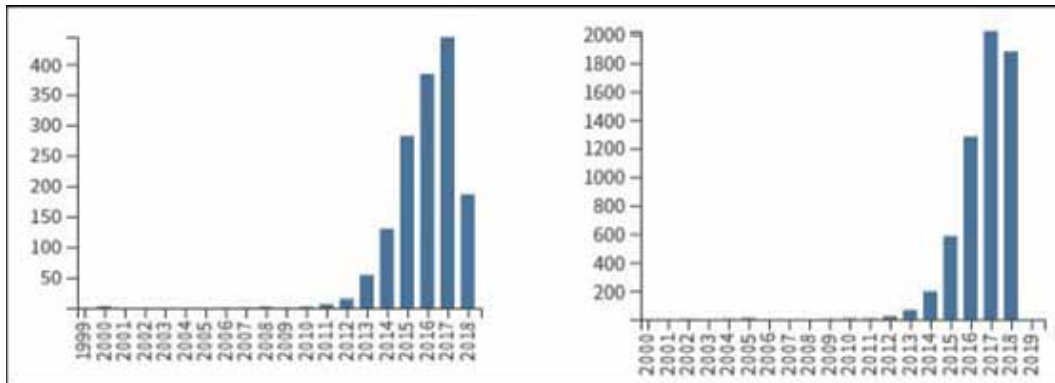
Numerous scholars in the world start to be aware that the traditional teacher-centered and lecture-based pedagogy tend to cause students to be passive in the classroom (Doman and Webb, 2017). The past few years have witnessed increasing interest in the flipped classroom at all levels of the educational field (Hung, 2017). With fast development of ICT, EFL teaching approach should also undergo drastic innovations in order to meet modern educational needs. Teachers should make every effort to integrate ICT into EFL language teaching in an effort to create a flipped teaching approach, stimulating students' learning desire (Yi, 2017). Despite that there have been many studies discussing the effectiveness of the ICT assisted flipped pedagogical approach, few empirical studies have been committed to its effect on EFL learning (Lee and Wallace, 2018). It is thus necessary to determine the effectiveness of ICT assisted flipped pedagogical approach in EFL language learning and teaching.

The Number and Citations Of Publications In The Efl Ict Assisted Flipped Pedagogical Approach

As shown in Figure 1, the number of publications and citations of the EFL ICT assisted flipped pedagogical approach was obtained from the retrieved publications by using the tools in "Web of Science".

As revealed in Figure 1, the left histogram shows the number of publications per year. It can be clearly seen that there are few related publications from the year 1999 until 2009. The year 2010 witnessed a starting point of publications related to the EFL ICT assisted flipped pedagogical approach, after which the publications steadily climbed up until the peak in 2017. The year 2018 experienced a decline in publications possibly because the retrieval occurred on November 10, 2018. The remaining two months' or more publications were not included due to the indexing schedule.

Figure 1. The number of publications and citations per year



The right histogram shows the number of citations related to the EFL ICT assisted flipped pedagogical approach from the year 2000 to 2018. It is clearly shown that from the year 2000 to 2009, very few citations were included. The year 2010 witnessed the beginning of related citations. After that the number of citations sharply increased until the peak in the year 2017, which is consistent with the number of publications. The year 2018 did not see a great number of citations possibly due to the indexing issue as well.

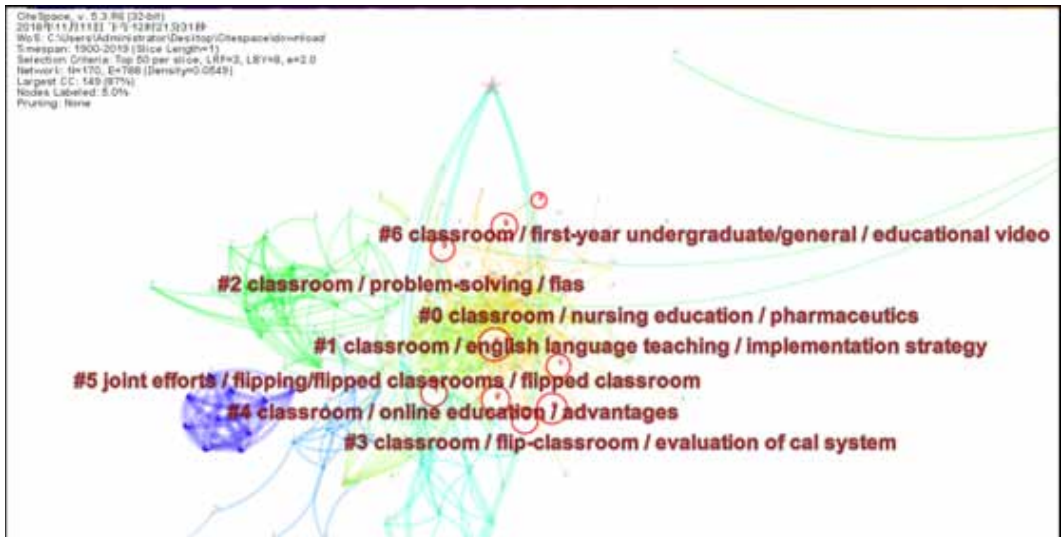
RESULTS FROM CITESPACE

CiteSpace is regarded as a widely accepted tool to map knowledge (Chen, 2006), which is designed to analytically visualize co-citation networks on the basis of paper citations to show the framework of a specific discipline (Chen et al., 2010).

The CiteSpace program was set as follows: (1) Time slice ranged from 1900 to 2019; (2) Term sources in the text processing were title, abstract, author keywords, and keywords plus; (3) The node type was cited reference; (4) The linking strength was cosine with the scope “within slices”; (5) The selection criterion was “select top 50 levels of most cited or occurred items from each slice”; (6) The pruning criteria were “pathfinder” and “pruning the merged network”. After running CiteSpace, we got the map shown in Figure 2. The clustering function was performed by choosing ‘T’ as the labeling source and log-likelihood ratio as the method. The results returned seven knowledge clusters and two of them are major clusters based on co-citation cluster information. The values of Mean Silhouette should be between -1 and 1. Values close to 1 mean articles within a cluster are highly consistent or similar in terms of content. In this study, the Silhouette values are 0.65 and 0.578 in two major clusters respectively. The mean Silhouette values are greater than 0.57, which indicates that the cluster analysis reaches a satisfactory level.

Specifically, it can be clearly identified from Figure 2 that the network is divided into 7 co-citation clusters. These clusters are labeled by index terms from their own citers, such as classroom, nursing education, pharmaceuticals, EFL language teaching, implementation strategy, problem solving, flip-classroom, online education, advantages, joint efforts, flipping/flipped classroom, and first-year undergraduate/general/educational video. This indicates that in the years when the flipped classroom is under exploration, scholars tend to focus on the above issues, which suggests future research directions for readers.

Figure 2. Co-citation Clusters of the Cited Literature



Major Clusters

The largest 2 clusters are summarized. The largest cluster (#0) has 37 members and a silhouette value of 0.65. It is labeled as scoping review by LLR and classroom by TFIDF. Indexing terms include: massive open online courses (MOOCs), population health, digital learning, clinical skills, competency-based education, pharmacy students, qualitative research method course, social science, management education, student perspective, adult learners, China, pharmaceutical calculations, personalization, student ratings, student outcomes, andragogy, intelligent tutoring systems, advanced science courses, instructional technology, strategy, game elements, student perceptions of flipping the classroom, app, adolescents, algebra, formative assessment, student-centered instruction, e-assessment, elementary education, students achievement, microscopic anatomy education, language learning, foreign language classrooms, economics in higher education, dual credit, graduate level, methods, middle school, medical curriculum, reversed teaching, gradueness, pronunciation, course evaluation, learner-generated content, pharmaceutics, evaluation, anatomy education, higher order thinking skills, pre-service teacher concerns, social and clinical psychology, attitude, individual differences, millennial, authoring tools, self-care, students' perceptions, exam preparedness, learning communities, health care law, alternative learning strategies, simulation, digital technologies, education research, anaesthesia training, electrocardiogram learning, conceptual/procedural understanding, grades, online tutorial recordings, pre-clinical veterinary science, intention to use, high education, integrative review, medical certificate education, families, nursing students, didactic lectures, interdisciplinary curriculum, screen-casting, medical errors, immunology, quantitative research methods, laparoscopic suture, graduate level setting, fourth year, deep learning, epidemiology, learning goals, Moodle, nonprescription drugs, millennial, oncology therapeutics, bibliometric, peer discussion, peer learning, 21st century learning, histology education, special education, implementation strategy by MI. The most active citer to the cluster is (0.1601) Gomez, Garcia Ivan (2015) The flipped classroom through the smart-phone: effects of its experimentation in high school physical education, published in the journal "Prisma Social".

The second largest cluster (#1) has 35 members and a silhouette value of 0.578. It is labeled as classroom approach by LLR, and classroom by TFIDF. Indexing terms include: implementation strategy, classroom attitudes, distributed collaborative learning, inverted classrooms, online learning, collaborative learning, instructional strategies, EFL as a foreign language, articulate storyline,

accreditation, indigenous, digital game-based learning, EFL as foreign language, instruction design, application, emerging technologies, e-learning, digital literacy, electronic learning, health management, classwork design, L2 teaching/learning, flipped classroom model (FCM), internet of things, attitudes, certificate examination, active-collaborative strategies, executive education, course teaching, EFL language, foreign language writing, learning achievement, first principles of instruction, developing teacher capacity, council on education in public health, learning achievements, blended classrooms, K-12 teaching, geography, Clicker technology, degree in early childhood education, Hong Kong, hybrid/blended/inverted course design, component analysis, conferences, commission on accreditation of healthcare management education, large lecture, blended learning environment, cognitive presence, enjoyment, idiomatic acquisition, homework, ESP (English for specific purposes), assessment for learning, lag sequence analysis, innovative teaching, massive open online courses (MOOCs), population health, digital learning, clinical skills, Moodle platform, competency-based education, pharmacy students, attitudes toward statistics, educational evaluation, qualitative research method course, application software education, social science, software engineering education, management education, student perspective, adult learners, hypermedia, analytical chemistry, mobile robotics, China, micro course, pharmaceutical calculations, personalization, science class, student-centered classroom, student ratings, student outcomes, andragogy, technology and pedagogy, operations management, instructor experiences, intelligent tutoring systems, advanced science courses, EFL reading comprehension, attitude to chemistry, instructional technology, and strategy. The most active citer to the cluster is (0.1441) Howitt, Christine (2015) Implementing a flipped classroom approach in postgraduate education: an unexpected journey into pedagogical redesign, published in “Australian Journal of Educational Technology”.

Citation Counts

Citation counts were calculated through CiteSpace (see Table 1). The top ranked item by citation counts is Bergmann J (2012) in Cluster #1, with citation counts of 276. The second one is Strayer JF (2012) in Cluster #1, with citation counts of 147. The third one is Mclaughlin JE (2014) in Cluster #0, with citation counts of 124. The fourth is Oflaherty J (2015) in Cluster #1, with citation counts of 122. The fifth is Davies RS (2013) in Cluster #1, with citation counts of 113.

Table 1. Citation counts

| Citation counts | References | Cluster # |
|-----------------|---|-----------|
| 276 | Bergmann J, 2012, FLIP YOUR CLASSROOM, 0, 0 | 1 |
| 147 | Strayer JF, 2012, LEARNING ENV RES, 15, 171 | 1 |
| 124 | Mclaughlin JE, 2014, ACAD MED, 89, 236 | 0 |
| 122 | Oflaherty J, 2015, INTERNET HIGH EDUC, 25, 85 | 1 |
| 113 | Davies RS, 2013, ETR&D-EDUC TECH RES, 61, 563 | 1 |

Bursts

Rankings of bursts were analyzed through CiteSpace (See Table 2). The top ranked item by bursts is Hung HT (2015) in Cluster #1, with bursts of 7.29. The second one is Fulton KP (2012) in Cluster #2, with bursts of 6.06. The third one is Mazur E (2009) in Cluster #2, with bursts of 5.89. The fourth is Gannod GC (2008) in Cluster #2, with bursts of 5.60. The fifth is Flumerfelt S (2013) in Cluster #1, with bursts of 5.29.

Table 2. Rankings by bursts

| Bursts | References | Cluster # |
|--------|---|-----------|
| 7.29 | Hung HT, 2015, COMPUT ASSIST LANG L, 28, 81 | 1 |
| 6.06 | Fulton KP, 2012, PHI DELTA KAPPAN, 94, 20 | 2 |
| 5.89 | Mazur E, 2009, SCIENCE, 323, 50 | 2 |
| 5.60 | Gannod GC, 2008, ICSE08 PROCEEDINGS OF THE THIRTIETH INTERNATIONAL CONFERENCE ON SOFTWARE ENGINEERING, 0, 777 | 2 |
| 5.29 | Flumerfelt S, 2013, EDUC TECHNOL SOC, 16, 356 | 1 |

Centrality

Rankings of items by centrality were conducted through CiteSpace (See Table 3). The top ranked item by centrality is Pierce R (2012) in Cluster #0, with centrality of 0.17. The second one is Davies RS (2013) in Cluster #1, with centrality of 0.15. The third is Strayer JF (2007) in Cluster #5, with centrality of 0.14. The fourth is Herreid C (2013) in Cluster #1, with centrality of 0.13. The fifth is Tucker B (2012) in Cluster #1, with centrality of 0.09.

Table 3. Rankings by centrality

| Centrality | References | Cluster # |
|------------|---|-----------|
| 0.17 | Pierce R, 2012, AM J PHARM EDUC, 76, 0 | 0 |
| 0.15 | Davies RS, 2013, ETR&D-EDUC TECH RES, 61, 563 | 1 |
| 0.14 | Strayer JF, 2007, THESIS, 0, 0 | 5 |
| 0.13 | Herreid C, 2013, J COLL SCI TEACH, 42, 62 | 1 |
| 0.09 | Tucker B, 2012, ED NEXT, 0, 82 | 1 |

Sigma

Item rankings by sigma were conducted through CiteSpace (See Table 4). The top ranked item by sigma is Strayer JF (2007) in Cluster #5, with sigma of 1.87. The second one is Gannod GC (2008) in Cluster #2, with sigma of 1.53. The third is Fulton KP (2012) in Cluster #2, with sigma of 1.47. The fourth is Mazur E (2009) in Cluster #2, with sigma of 1.40. The fifth is Hung HT (2015) in Cluster #1, with sigma of 1.11.

Table 4. Rankings by sigma

| Sigma | References | Cluster # |
|-------|---|-----------|
| 1.87 | Strayer JF, 2007, THESIS, 0, 0 | 5 |
| 1.53 | Gannod GC, 2008, ICSE08 PROCEEDINGS OF THE THIRTIETH INTERNATIONAL CONFERENCE ON SOFTWARE ENGINEERING, 0, 777 | 2 |
| 1.47 | Fulton KP, 2012, PHI DELTA KAPPAN, 94, 20 | 2 |
| 1.40 | Mazur E, 2009, SCIENCE, 323, 50 | 2 |
| 1.11 | Hung HT, 2015, COMPUT ASSIST LANG L, 28, 81 | 1 |

Advantages of the EFL ICT Assisted Flipped Pedagogical Approach

A great number of studies have recently explored the ICT assisted flipped pedagogical approach to EFL language learning (e.g. Asoodar, Atai, Vaezi, & Marandi, 2014; Han, 2015; Stockwell, 2013). The flipped classroom pedagogy has been reported on many advantages such as convenient access to lecturing videos and contents (Fulton, 2012), stimulation of thinking within and outside class (Kellinger, 2012), promotion of individualized learning styles (Bishop and Verleger, 2013), and provision of more time for students to engage in inventive research (Herreid and Schiller, 2013). Furthermore, the flipped classroom, an innovative pedagogical approach, could maximize the effectiveness of teaching, cultivate autonomous learning style, improve the individual learning, better teachers' teaching skills, enhance the academic atmosphere, improve the overall academic quality, and finally augment the teaching and learning effectiveness (Yi, 2017).

The ICT assisted flipped pedagogical approach was also demonstrated effective in the field of business EFL education. The effectiveness of educational game-based learning could be augmented by using a flipped approach. Flipping the game-based approach could improve students' business EFL writing skills. Those who received flipped business EFL teaching performed significantly better than those who received traditional teaching (Lin et al., 2018). The ICT assisted flipped pedagogical approach has achieved a great success in business EFL learning and teaching, where significantly better learning outcomes and higher satisfaction level were revealed than the non-flipped approach (Yu and Wang, 2016).

Merely an ICT assisted flipped pedagogical approach without any other assistance may be hard to achieve success in EFL language education. Combination of a flipped classroom approach with a project-based learning approach could effectively improve business EFL skills; mobile learning approach could enhance interaction, production and reflection; and the flipped mobile pedagogy helped learners to cope with different practitioners and select various media (Nickerson, 2018).

Assisted with a serious game, the ICT assisted flipped pedagogical approach was evidenced highly effective. In a smart phone GPS treasure-hunting game in a flipped EFL class, students were intrinsically motivated by the hunting experience, felt connected to others across the world, enjoyed the searching process, and had a pleasant experience of designing and presenting their videos. This flipped approach is highly interesting and effective for EFL instructors whose native language is not English (Freiermuth, 2017).

With the assistance of ICT, the ICT assisted flipped pedagogical approach also achieved success in EFL education. In the information age, ICT has become increasingly popular in higher education. In EFL teaching, it is necessary to widely adopt the flipped classroom pedagogy assisted with ICT in order to raise EFL teaching quality, students' English communicative abilities, and EFL teaching and learning efficiency. It is thus feasible and significant to apply the flipped classroom method to EFL teaching practice (Peng, 2017). In the flipped classroom, students' ICT literacy and English reading comprehension also significantly improved compared with those in the non-flipped (Huang and Hong, 2016).

E-learning platforms were used to demonstrate the effectiveness of the ICT assisted flipped pedagogical approach. The ICT assisted flipped pedagogical approach modifies the sequence of learning and teaching. Via an e-learning platform-the Edmodo platform where detailed presentations and attractive videos were involved, students significantly improved their academic achievements in English language grammar in Level B1 (Melendez and Iza, 2017). Through Edmodo, students received a flipped pedagogy throughout the summer session, which they felt satisfied with and reported fair perceptions of the flipped model. They also showed significantly stronger autonomy than those who learned English based on a non-flipped classroom pedagogy (Santikarn and Wichadee, 2018).

A more advanced e-learning platform is also in favor of the ICT assisted flipped pedagogical approach in EFL education. An autonomous learning system of junior English flipped classroom assisted with advanced information technologies based on adaptive algorithm was developed, which could dynamically record relevant learning behaviors and simultaneously save the true English

proficiency of individual students at various levels of knowledge. This system could realize a personalized learning style and improve English learning efficiency (He, 2018).

Many other studies arrive at supportive conclusions on the effectiveness of the ICT assisted flipped pedagogical approach in EFL language education. Three surveys and a teacher's notes reported that students achieved significantly greater achievements in EFL learning through flipped pedagogy than those through traditional pedagogy, although significant difference was merely revealed in the final exam. The majority of students were keen on the flipped pedagogy and the teacher also reported that students were more engaged in the flipped than the traditional classroom (Lee and Wallace, 2018).

Engagement in the flipped classroom, as well as learning outcomes, was also enhanced through empirical studies. It was demonstrated through a pre-post quasi-experimental design that the flipped classroom could enhance students' engagement in EFL classroom (Aycicek and Yelken, 2018). The ICT assisted flipped pedagogical approach achieved success in teaching Educational Models in EFL at Education National University of Ecuador (Uvaldo et al., 2018). The small private course-based flipped classroom of EFL pedagogy could effectively improve EFL learning via rich learning and teaching resources, satisfactory environment, and flexible choice of time and venue (Zhang et al., 2018). The ICT assisted flipped pedagogical approach in EFL language classroom could encourage students to respond to questions and engage in academic activities. The flipped model that provides lecture-based videos beyond class and organizes learning activities in class could enhance students' positive learning attitudes and form strong learner self-regulation (Doman and Webb, 2017).

Motivation of EFL language learning was also promoted in the flipped EFL language classroom. The ICT assisted flipped pedagogical approach applied a natural teaching method to learning and teaching process, which provided students with a context where they could naturally acquire linguistic knowledge rather than learn EFL language involuntarily (Sam, 2016). The ICT assisted flipped pedagogical approach could improve students' motivation in EFL language learning (Robles, 2016). Students were largely in favor of the flipped learning strategy, which could enlarge the lecturing contents and enhance their understanding. The flipped approach was in need of sufficient preparation to enhance student motivation and improve learning outcomes, which might be under the impact of the monitoring system and the motivational settings.

The ICT assisted flipped pedagogical approach could also improve students' EFL writing skills. It was demonstrated that students in the flipped classroom held significantly more positive attitudes towards the learning approach than those in the non-flipped classroom (Doman and Webb, 2017). The positive attitudes could definitely encourage students to participate in the flipped classroom. Compared with those in the non-flipped teaching, students adopting the flipped approach spent significantly longer time making preparations for class and used significantly more various words in EFL composition writing. Under the flipped model, students' EFL writing skills also significantly improved than those under the non-flipped model. Reasons for the above significant gain might be the ability to peruse text analysis many times and the immediate access to frequent feedback from the instructor (Leis et al., 2015). The structured or semi-structured flipped approach could produce more effective results than the non-flipped, leading to better academic achievements, cultivating more positive attitudes, and causing students to spend more efforts.

Disadvantages of the EFL ICT Assisted Flipped Pedagogical Approach

Despite that numerous advantages have been found out, disadvantages of the flipped approach have also been revealed, e.g. difficulty in supervising students' learning activities out of class (Bristol, 2014; Kordyban and Kinash, 2013). The biggest hindrance does not lie in design of video lecturing but in in-class activity organization and its integration into the flipped approach (Lafee, 2013).

Negative learning outcomes were revealed in the ICT assisted flipped pedagogical approach. The flipped pedagogy of freshman English library instruction did not significantly improve students' academic performances than the non-flipped approach. The results may be due to the small sample size, the random influence of various assignments, or the weak control over the assignment completion.

Further research is therefore needed to determine whether the flipped approach is appropriate for the one-shot English library instruction (Miller, 2017).

Cautious attitudes toward the ICT assisted flipped pedagogical approach also exist due to inconsistent findings. Use of the “flipped classroom” pedagogy in secondary English language classrooms proved that merely students in one class statistically increased English knowledge, while not for the other. Students generally held positive attitudes towards the flipped pedagogy, while teachers believed it might merely be beneficial to English grammar teaching although the flipped model is innovative enough. The flipped pedagogy might also be effective for motivated students, and what worried teachers might be the design of appropriate online video lectures (Yang, 2017).

DISCUSSION

This part will discuss some methodological issues arising in the past research, coupled with readiness and integration of the ICT assisted flipped pedagogical approach in EFL education.

Issues of Methodology

There are numerous issues in methodology, which might have influenced the reliability of findings. Effect size reporting can improve the understanding and perception of findings and estimated power of target variables related to population (Cohen, 1994). However, most of the past studies failed to report specific effect sizes, which might have negatively influenced the reliability of results. Shortage of measurements of validity and reliability of research instruments might weaken the credibility of the constructs (Han and Finkelstein, 2013). However, most studies on the ICT assisted flipped pedagogical approach to EFL education did not measure the validity and reliability of research instruments, which might have decreased the research persuasiveness.

Merely qualitative research methods were adopted to study the effects of the ICT assisted flipped pedagogical approach to EFL education, which might fail to fully identify the reliability of the selected instruments (Lincoln, Lynhan, and Guba, 2011). Some studies adopted parametric methods to analyze the results without testing the distribution of data, which could possibly lead to unreliable results.

Readiness and Integration

The readiness and integration of the ICT assisted flipped pedagogical approach into other approaches were evidenced beneficial to EFL education. The formation process of conceptual framework for the flipped pedagogical readiness among EFL teachers was formulated and discussed, which could provide references for designers and practitioners of the ICT assisted flipped pedagogical approach (Salleh et al., 2018). The dynamic combination of micro lectures, Massive Open Online Courses and flipped pedagogy was necessary to create student-centered authentic environment of EFL learning, to cater for different individual EFL learning needs, to improve EFL learning effects and to push forward EFL teaching reform (Zhang and Zhang, 2018).

CONCLUSION

This part will summarize major findings and limitations in this study, as well as future research directions.

Major Findings

Through a systematic literature review, we arrived at the conclusion that most of the studies support the ICT assisted flipped pedagogical approach in EFL education although there are still some different findings. The flipped classroom pedagogy in EFL education could bring many advantages such as convenient access to lecturing videos and contents, stimulation of thinking, promotion of individualized learning styles, provision of more time for students to engage in inventive research, increase in overall EFL educational effectiveness, success in business EFL education, successful combination

with other approaches, effectiveness combined with serious games, ICT, and e-learning platforms, improvements on EFL writing skills, and enhancement of motivation. Disadvantages of the EFL ICT assisted flipped pedagogical approach include difficulty in supervising students' learning activities, organization of in-class academic activities, cautious attitudes and some negative learning outcomes.

Limitations

Publications reviewed in this study are mainly limited to "Web of Science". The medium language is mainly English. This study cannot cover all the publications in all languages across the world. Some studies may therefore be excluded, which may weaken the reliability of the research findings.

Future Research Directions

In order to determine the effectiveness of flipped pedagogy in EFL education, both quantitative and qualitative research methods should be included. Future research should include more participants in practice majoring in various kinds of subjects and the experimental period of time should be long enough. The target language in the research experiments should be easily understood by participants and researchers (Yang, 2017). Future research may focus on the interdisciplinary research into the ICT assisted flipped pedagogical approach.

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