A Systematic Analysis of Chinese Reviews of Flipped Classroom

Meilun SHIH[a*] & Feng-Ru SHEU[b]
[a]*Center for General Education, National Taiwan University, Taiwan*
[b]*Universtiy Libraries, Kent University, USA*
*mshih@ntu.edu.tw

Abstract: Flipped classroom (FC) is a recognized and popular approach of teaching and learning in the field of education. However, the large body of studies make it difficult to access a comprehensive summary of available evidence to evaluate the impact and effective implementation of FC. The aim of this review of reviews is to explore two questions: 1) What are the trends of FC studies that were identified in reviews in the last decade? 2) What are the trends of Chinese FC reviews that were conducted in the last decade? Results of this review can be used to guide future interventions and implementation in the field.

Keywords: Flipped classroom, systematic review

1. Introduction

Flipped classroom (FC) is a new and popular way of teaching and learning that has attracted extensive scholarly attention in the field of education (Akcayir & Akcayir, 2018). Since 2010, a significant number of articles related to FCs have been published; not only in North America, but around the world. In China, the first FC study in Chinese academic journal database CNKI was published in 2012 and the number of related studies rocketed in next few year. For a field to continuously progress, it is important to be aware of its developmental patterns in the past to obtain insights for future implications (Dwivedi, Venkitachalam, Sharif, Al-Karaghouli, & Weerakkody, 2011). Given the promising potential of FC, systematic reviews are essential for revealing information about the trend and impact of flipped approaches in China. However, each review has its own scope and comprehensiveness (Law, Leung, & Cheung, 2012). For example, when a review focuses on providing a thorough background, it might miss more recent developments. Based on the different perspective of examination of each review, different set of studies might be selected and different analysis results would be generated at the end. This study identifies this gap in previous reviews and aims to provide a more comprehensive glimpse of FC development in China through the lens of a review of reviews. It also aims to mark the development of FC reviews conducted in the past decade in hope to classify the process of possible directions for future research.

More specifically, the purpose of current study is to systematically examine relevant Chinese reviews concerned with FC that were published during the last decade. This review is guided by two questions: 1) what are the trends of FC studies that were identified in reviews in the last decade? 2) what are the trends of FC reviews that were conducted in the last decade?

2. Method

2.1 Inclusion and Exclusion Criteria

The quality of the included reviews is an important consideration for review study. There are several criteria can be used to select articles. For example, use articles that are published in journals which are indexed in profound databases like SSCI, use articles published in one or several leading journals in a field, or use articles with highest citation rate. For this study, we select articles that were published in journals included Chinese Social Science Citation Index (CSSCI). CSSCI is an interdisciplinary citation index for Chinese journals. It was developed by Nanjing University in 2000. More than 500 journals of

humanities and social sciences are included in CSSCI. Because of the high quality of published papers, many leading universities in China use CSSCI as an evaluation indicator for faculties' academic performance or promotion. We use CNKI platform to access CSSCI database and search for papers.

2.2 Search Strategy and appraisal

The search took place in May 2019. Chinese reviews about FC were selected from journals in the CSSCI database. Key search titles and terms like "flipped classroom", "inverted classroom", "literature review", and "systematic review" in Chinese are used for paper selection. After the searching process, each article was examined by researchers to check abstract, or full article if necessary, for the suitableness for the purposes of this study. The final sample size retained for data analysis for this study was 18.
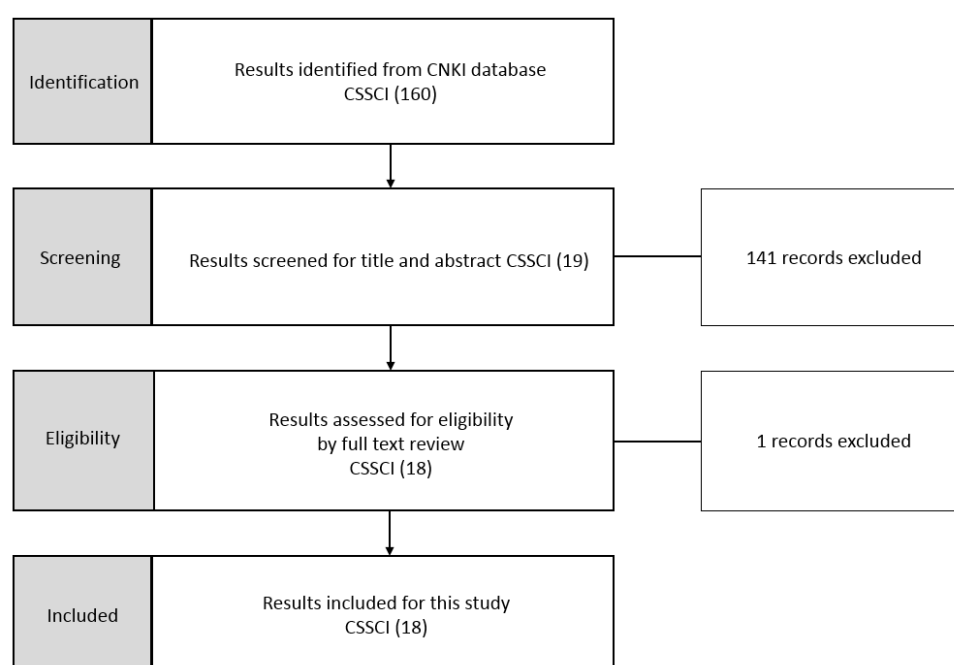

Figure 1. Flow chart of the selection of articles in the review process

Data was independently reviewed by researchers using a standardized form to extract information such as publication year, research method, and review results. See Appendix A for the whole list of reviews included in this study. Generated themes from the results of these reviews were categorized into more comprehensive groups based on their similarities. Different opinions between two researchers were further discussed until a consensus was reached.

3. Result

3.1 General characteristics of the FC studies

3.1.1 Keyword clustering

Thirteen out of the 18 FC reviews conducted keyword cluster analysis. Among the 13 reviews, eight focused on Chinese FC studies, three focused on English FC studies, and two performed analysis to both Chinese and English FC studies. Table 1 shows the top ten high-frequency keywords that were identified from Chinese and English FC studies. For Chinese FC studies, "active learning" (12), "massive online open course (MOOC)" (12), and "instructional design" (11) are the three keywords with highest frequency counts. For English FC studies, "active learning" (5), "blended learning" (5), and "education" (5) were the keywords with the highest-frequency.

Table 1

The top ten high-frequency keywords in Chinese and English FC studies

Chinese Keyword	Frequency	English Keyword	Frequency
Active learning	12	Active learning	5
MOOC	12	Blended learning	5
Instructional design	11	Education	5
Information technology	10	Problem-based learning	4
Teaching model	10	MOOC	4
Micro-courses	10	Engagement	3
Instructional videos	10	Team-based learning	3
Learning process	9	Collaborative learning	3
Classroom instruction	9	Higher education	3
Teaching innovation	9	Student-centered learning	3

3.1.2 Summary of findings in FC studies

Inductive analysis was conducted on the result, discussion and conclusion sections of the included FC reviews, and the results were showed in Table 2. Findings of FC studies that were identified in FC reviews can be categories into three sections: current situation, effectiveness of FC, and concerns of FC studies. For each main category, subcategory for more detailed findings were generated as well.

Table 2

Summary of findings of FC reviews

Main category	Subcategory	Source of review
Current situation of FC	Stable trend of FC studies	1, 7, 8
	Localization studies of FC	1, 6, 8
	Focus on empirical studies	1, 9
	Obvious core researchers and institutions	8, 9, 14
Effectiveness of FC	Positive impact on students' learning	2, 3, 13
	FC has different effect on different size of class	3
	FC is good for studying practical knowledge	4, 5
	FC has different effect on different subject learning	3
	FC has different effect on different grade level	4, 5
Concerns of FC studies	Unbalanced distribution of disciplines	1, 9, 10, 14, 17
	Insufficient empirical research and comparative research	1, 7, 11, 12, 15, 16
	Inadequate connection to theory	1, 9, 14
	Shortage of evaluation research	1, 7, 13, 16, 17
	Shortage of resource development	1, 7, 13, 16
	Small sample size	2
	Insufficient field sharing	10, 11, 17

3.2 General characteristics of FC reviews

3.2.1 Publication by year, language, and data source

Of the 18 reviews, there are 8 of them were published in 2016, 4 in 2018, and 2 in 2015, 2017, and 2019. This result corresponds to the development of FC researches in China. Ten out of 18 reviews only analyzed studies published in Chinese. Five reviews included both Chinese and English studies about FC. Three reviews published in 2015 and 2016 analyzed only English papers about FC. Chinese FC studies were usually extracted from journals that were indexed in CNKI, VIP and Wanfang databases. And English FC studies were extracted from journal that were indexed in databases like Web of Science, Education Resources Information Center (ERIC), and Google Scholar. Most reviews used academic studies as reviewed subjects, and only one review used proceeding papers from a FC conference as the analyzed subject.

Table 3

Descriptive information of Chinese FC reviews

	Publication year	Review method	Language of reviewed papers	Tool for analysis	Sample size	Chosen period
1	2019	Mix	Chinese		116	5 (2013-3017)
2	2019	Quantitative	Chinese/English	Review Manager	19	12 (2007-2018)
3	2018	Quantitative	Chinese/English	Review Manager	38	7 (2011-2017)
4	2018	Quantitative	Chinese		37	11 (2007-2017)
5	2018	Quantitative	Chinese/English		70	5 (2012-2016)
6	2018	Qualitative	Chinese	Content analysis	30+	2 (2016-2017)
7	2017	Mix	Chinese	CiteSpace	9,845	5 (2012-2016)
8	2017	Mix	Chinese	CiteSpace	356	16 (2000-2016)
9	2016	Mix	Chinese	CiteSpace	2,503	4 (2012-2015)
10	2016	Mix	Chinese/English	CiteSpace	128	4 (2012-2015)
11	2016	Mix	English	Bicomb	308	9 (2007-2015)
12	2016	Mix	English	CiteSpace	158	16 (2000-2015)
13	2016	Mix	Chinese	Bicomb	509	5 (2012-2016)
14	2016	Mix	Chinese/English	Bicomb	153	16 (2000-2015)
15	2016	Qualitative	Chinese	Bicomb	918	3 (2012-2014)
16	2016	Mix	Chinese	Bicomb	3,690	4 (2012-2015)
17	2015	Mix	Chinese	SATI Ucinet	201	4 (2012-2015)
18	2015	Mix	English	CiteSpace Bicomb	216	16 (2000-2015)

3.2.2 Research method

Research methods of FC reviews can be generally categorized into qualitative and quantitative. Qualitative methods focused on the content analysis to generate common themes among studies, and quantitative methods studies focused on numerical data. However, some qualitative studies might use quantitative data-analysis techniques such as frequency or percentage analysis to analyze data. Therefore, we broadly sorted FC reviews into three research methods: qualitative review, quantitative review, and mixed method review.

Bibliographic Items Co-occurrence Matrix Builder (Bicomb) and CiteSpace are the two main tools used in mix reviews. Half of reviews published before 2018 used BICOMB to extract and count information to generate the co-occurrence matrix and provide basic data for subsequent statistical

analysis. CiteSpace is another popular tool to visualize and analyze trends and patterns in FC studies. There are 5 reviews used it to identify topical areas, find citation hotspots, and support structural clustering of data. For reviews focused on quantitative data, two of them used Review Manager (RevMan) for data analysis. RevMan is a software that supports meta-analysis of quantitative data and presents results graphically.

3.2.3 Sample size and chosen period

The sample size of the 18 reviews varied from study to study, ranging from 19 to 9,845. Overall, quantitative reviews had sample sized less than 100 studies. This is probably because quantitative reviews required more strict criteria of selecting studies with specific data set for analysis. Mix and qualitative reviews used Bicomb or CiteSpace can directly extract bibliographic data from database, therefore, they usually included more analyzed subjects (ranged from 128 to 9.845). The majority reviews specified the chosen period in their review. The average timeframe for Chinese FC reviews are 8 years. In general, reviews focused on English or the ones included English FC studies usually had longer chosen period of reviewed subjects (with average 10.6 years).

4. Discussion

4.1 Trends of FC studies

The development of FC studies in China can be divided into four stages: introduction (2012-2013), bloom (2013-2014), growth (2015-2016), and maturity (after 2017) (Chen & Liu, 2017; Mei, 2019). Since the first FC CSSCI study was published in 2012, the number of FC study increased rapidly. The high interest of FC in China might be resulted from two reasons: 1) The 10-years educational policy of e-learning encouraged the integration of information technology in teaching, and 2) the MOOC movement in China in 2013 (Hu, Dong, & Yang, 2017). However, based on the analysis of author and institutions, the majority FC studies in China were conducted by a group of core researchers and published from Normal Universities (Bu & Kong, 2016; Zhao & Cui, 2016). This situation leads to one of the concerns that several researchers indicated in their reviews: the unbalanced distribution of discipline. As indicated Wu and Zhang's (2016) review, 86.86% of the subjects of Chinese FC studies are in related field of education. The highly centralized distribution of FC studies limits

Results of keyword analysis indicated that the number of keyword in Chinese FC studies gradually increased over the years. This means the scope and range of Chinese FC studies expend to discuss more issues of FC. The high-frequency keywords of FC studies can be categorized into four groups: learning theory (active learning and learning process), teaching theory (instructional model, teaching innovation, and classroom instruction), curriculum (instructional design), and resource (MOOC, micro-course, teaching video, and information technology). Compare to English FC studies, Chinese FC studies seem to pay more attention on the related resource and technology of delivering FC. In addition, Chinese FC studies focus more on exploring FC from the teaching perspective instead of learning perspective.

The four quantitative reviews took a thorough look at the impact of FC on teaching and learning. These reviews concluded that FC has positive impact on students' learning from many different perspectives. For example, FC has different influences on different class size, grade level, study stage, subject, and types of knowledge.

4.2 Trends of FC reviews

In respond to the rapidly arouse of FC studies in China since 2014, there was a need of systematically review FC studies to have a comprehensive understanding of trend and pattern of FC development. More than half of the FC reviews we gathered for this study were published in or after 2016. Based on the cross-tabulation analysis, FC reviews published before 2017 tended to take mix method approach. Bicomb and CiteSpace were the two most used tools to extract FC studies' bibliographic data from database. More recent reviews tended to focus on quantitative data in FC studies and used software like RevMan to statistically evaluate the impact of FC.

FC reviews in China tend to take an overall perspective to FC studies. Most of them didn't set specific criteria of paper selection. No review focused on FC studies in one certain discipline, and some of them did not specify chosen period of their reviewed subjects. The review included more than 9,000 thousand studies used only one keyword "flipped classroom" for searching. One of the possible reasons is that many Chinese FC reviews used tools like Bicomb and CiteSpace to directly extract large amount of bibliographic data from databases. These type of tools allowed FC reviews to easily perform cluster analysis and include more studies for reviews. In addition, the development of FC studies in China is less than ten years. Therefore, FC reviews tend to set no limit on searching period. However, this trend of including everything and anything leads to another concerns about FC reviews in China. While reviews which based on a large amount of studies provided an overall picture of the trend in the field, they rarely provided detailed analysis and explanation to the actual impact or implemental changes. Chinese FC reviews provided answers to who, when, where, and how questions about FC studies, but they did not provide enough information to evaluate the actual impact of FC approach on one specific area, subject, or context.

5. Conclusion

This review of reviews examined Chinese FC reviews that was published in last decade. While most reviews took mix method to analyze overall trends of FC studies, more recent reviews focused on quantitative data about the influence of FC on learning. All quantitative reviews concluded that FC has positive impact on students' learning. In addition, FC has different impact on different class size, grade level, study stage, subject, and types of knowledge. Based on the annual number of Chinese FC studies, the development of FC in China seems to reach to the stage of stable or into descended in recent two years. Although there are still concerns of unbalanced distribution of subject and insufficient empirical studies, keywords analysis revealed that the topic range in FC studies was expanded. The majority studies discussed FC from the teaching perspective instead of learning perspective. Because this review only focused on Chinese FC reviews, more comparative study about FC reviews in different language or region might provide information to further investigate whether the developmental trends of FC identified in this study are only particular findings from one context or common trends cross context.

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