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RESEARCH ARTICLE

Integrating ARCS Motivation Model with Flipped Classroom in Foreign Language Teaching and Learning: A Systematic Literature Review

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ABSTRACT

Flipped classroom, an innovative approach that reverses traditional lecture and homework elements, has gained attention in foreign language teaching. This systematic literature review explored the interaction between flipped classroom and learning motivation, focusing on the ARCS motivation model (Attention, Relevance, Confidence, Satisfaction). According to PRISMA reporting guideline, our review process included the phases of Planning the review, Conducting the review, and Reporting the review. We searched five databases including SCOPUS, Science Direct, ProQuest, Research Gate, and CNKI, and 12 empirical articles were selected and analyzed. This study, based on the PICOS framework, extracted the research characteristics and methodologies, as well as the technological tools and their applications, from all selected articles. Among them, 11 studies indicated that the integration of flipped classroom and the ARCS motivation model could enhance both learners' foreign language skills (limited to listening, speaking, or writing) and their motivation levels, primarily in the aspects of Attention, Relevance, and Satisfaction. The aspect of Confidence, however, was found to be less significant. One study reported no improvement in motivation across all four ARCS dimensions, which might be attributed to factors such as teaching styles or students' individual attention spans. The limitations of the reviewed studies include a predominant focus on higher education, a limited number of studies, significant regional constraints in the application of technologies, and the lack of attention to reading skills in foreign language learning. The findings of this review highlight the effectiveness of integrating flipped classrooms with the ARCS model in enhancing foreign language learning outcomes.

1. INTRODUCTION

Motivation is key to foreign language learning (Crookers and Schmit, 1991; Lucas, 2010; Shiri, 2015), and may initiate and sustain the long, tedious learning process (Mirzaei et al., 2022). The term motivation, in short, can be defined as the purposeful willingness for learning something in order to fulfill specific goals, and is a psychological process of how long the learners can sustain their willingness and preferences (Javed et al., 2019; Mitchell, 1982; Paris and Oka, 1986; Snow and Lohman, 1984). Many scholars believe that future studies should explore integrated and effective motivational models and strategies into foreign language teaching-learning processes (e.g., Guilloteaux and Dörnyei, 2008; Shiri, 2015).

In order to stimulate and maintain learners' motivation and demonstrate the relationship between motivation and performance, John Keller (1987, 2010) created and developed the ARCS motivation model (Table 1), especially in the context of learning motivation. ARCS is the acronym for Attention,

Relevance, Confidence, and Satisfaction, with some sub-categories of motivational strategies and tactics. According to Keller (1987, 2010), Attention is the most significant factor of this model to stimulate and sustain the concentration, curiosity and interest of learners; Relevance is the contributory elements to meet the learners' needs, goals and motives; Confidence strategies help learners to believe in themselves for success; Satisfaction strategies aid to increase the learners' satisfaction level both intrinsically and extrinsically. The ARCS motivation model is regarded as the best motivation model in increasing the effectiveness of teaching conditions (Asiksoy and Özdamli, 2016), and in increasing learners' motivation (Javed et al., 2019; Keller, 2010).

Table 1: ARCS Motivation Model with sub-categories by John Keller (2010)

Attention	Relevance	Confidence	Satisfaction
Perceptional Arousal	Goal Orientation	Learning Requirements	Natural Consequences
Inquiry Arousal	Motive Matching	Personal Control	Positive Consequences
Variability	Familiarity	Success Opportunities	Equity

So far, there have been several studies investigating and exploring the ARCS motivation model applied in foreign language learning, but not limited to the following ones: ARCS motivation model has positive effect on students' self- assessed and self-directed English language skills (Huang, 2014), Japanese language (Kijima and Suzuki, 2003) , and can stimulate and enhance Chinese college students' motivation to English learning as well as the instructional efficiency (Chu, 2017; Zhang, 2015); the implementation of ARCS motivation model in the context of foreign language learning can be realized and achieved through various technologies such as social networks (Piriyasurawong, 2019), Podcast (Moura and Carvalho, 2012), E-book (Annamalai, 2016), e-learning (Kew et al., 2018), and MOOC (Chu, 2017).

Recently, with the rapid growth of new technologies in education and the developments of innovative pedagogical approaches as well as educational theories, some scholars and educators advocated the implementation of an innovative, effective and active pedagogical model that is named "flipped classroom" (Bergmann and Sams, 2012; Fulton, 2012; Pakpahan, 2020). It reverses the traditional instructional process of in-class lecture and after-class homework elements (Bergmann and Sams, 2012), switching learners' role from listener to center on more active and interactive learning activities and engaging the use of online programs and technologies (Baker, 2000).

The primary advantage of flipped classroom is to enhance learners' motivation and decrease their learning anxiety and boredom (Ho, 2019; Koller, 2011; Zou and Xie, 2018). Flipped classroom, as a more learner-centered approach, can contribute to a more flexible and efficient education particularly on intensive attention (Luo, 2021); additionally, it help to enhance learners' performance and academic achievements, and provide with personalized education appropriate for individual learning needs, satisfaction, and motives (Asiksoy and Özdamli, 2016; Bergmann and Sams, 2012; Berrett, 2012; Evseeva and Solozhenko, 2015). And all these contents are involved or included in the factors of Keller's ARCS motivation model mentioned above. Therefore, it is worth further studies on the ARCS motivation model and flipped classroom and their interaction effects, which is with great research value and significance.

In the literature, however, there are numerous studies showing that the ARCS motivation model and the Flipped Classroom respectively, which has been applied successfully in various fields and subjects, but limited studies have investigated them together (Asiksoy and Özdamli, 2016), and even less ones in foreign language learning. Hence, this study conducted a systematic review of various previous studies on the integration of ARCS motivation model and flipped classroom particularly in foreign language learning. Because a thorough and fair systematic literature review is of great scientific value, and can used to "summarize the existing evidence concerning a treatment or technology, to identify any gaps in current research in order to suggest areas for further investigation

and to provide a framework / background in order to appropriately position new research activities" (Kitchenham and Charters, 2007). This study aimed to analyze the methodologies, effects, outcomes and even possible challenges in line with the findings and to provide educators and scholars with a more accurate sense of ARCS motivation model and flipped classroom together so as to conduct more effective instructional designs and strategies. For this reason, we worked hard to answer the following research questions determined:

RQ1: How many studies on the ARCS motivation model and flipped classroom together particularly in the context of foreign language learning were published between 2012 and 2023, and what are their characteristics and methodologies employed?

RQ2: What tools and technologies were predominantly applied in these studies?

RQ3: What are the effects or outcomes of these studies?

To be more specific, the characteristics of the selected studies in RQ1 adhered to PICOS framework (Population, Intervention, Comparison, Outcomes, and Study Design). And we mainly focused on the studies particularly in the context of foreign language learning. For RQ3, besides the positive effects and outcomes of ARCS motivation model and flipped classroom together, we also paid attention to the challenges or problems we may face in the future studies if have. This study aimed to answer the above questions by conducting a systematic review and data analysis of previous studies indexed in common databases. The selected studies investigated the ARCS motivation model and flipped classroom together in the context of foreign language learning, proposing insights into the research methodology, instruments and technologies, effects and other aspects and matters, hoping to provide references for my doctoral project in ARCS motivation model and flipped classroom together to enhance foreign language listening skills.

2. METHODOLOGY AND PROCEDURE

The methodological approach employed in this current study was a systematic literature review, also known as systematic review, which is means of "identifying, evaluating and interpreting all available research relevant to a particular research question, or topic area, or phenomenon of interest" (Kitchenham and Charters 2007: 3). According to Kitchenham and Charters (2007), the review process of this current study can be divided into the main following phases: Planning the review, Conducting the review, and Reporting the review (Figure 1).

Global migration trends highlight the prominence of South-South migration, which now accounts for over one-third of international migration, outpacing South-North movements. This phenomenon is notably seen in Sub-Saharan Africa, the Middle East, and South America (Schewel and Debray 2023). Extra-regional migration has also surged, such as South Asian flows to the Middle East, forming the largest South-South migration corridor (Schewel and Debray 2023).

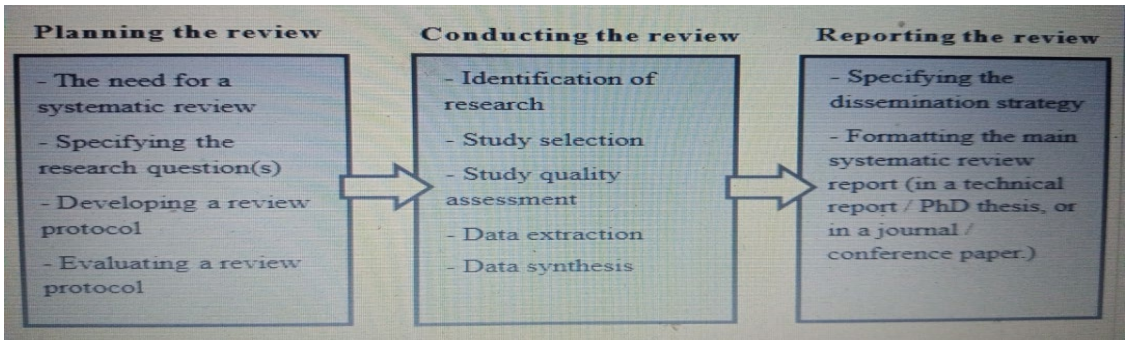

Figure 1: Phases and key steps of systematic literature review by Kitchenham and Charters (2007)

2.1 Planning the review

2.1.1 The need for a systematic review

We found there are a great number of studies as well as literature reviews on flipped classroom or ARCS motivation model separately. However, after the comprehensive literature searches, there are

only a few studies on ARCS motivation model and flipped classroom together, which need to be reviewed and analyzed for feasible designs or general conclusions inspiring this current study and more further studies. Moreover, so far no any review study on both of ARCS motivation model and flipped classroom together has been found, therefore, a systematic review in a thorough and unbiased manner is needed.

2.1.2 Developing and evaluating a review protocol

According to Kitchenham and Charters (2007), a pre-defined review protocol is necessary to minimize researcher bias and avoid selection of individual studies or analysis being influenced by the expectations of the researcher. The protocol should consist of all the components of the review as well as additional planning information, including but not limited to the following aspects:

- Background and rationale for the study;
- Research questions;
- Search strategy and process, including search terms, search sources, etc.;
- Study selection inclusion/exclusion criteria, including methodological quality, language, publication type, etc.;
- Study selection procedures;
- Study quality assessment;
- Data extraction strategy;
- Data synthesis and analysis;
- Dissemination strategy;
- Project timetable

After having been developed, the review protocol also need to be approved and evaluated by the relevant experts or peers or the commissioning or funding bodies (if available), who may offer valuable feedback on the protocol to make it more scientific and appropriate. Center for Reviews and Dissemination (CRD, 2009) of York University suggested the primary four criteria of CRD Database of Abstracts of Reviews of Effects, including: a) the descriptiveness and accuracy of the review's inclusion / exclusion criteria; b) the full coverage of relevant studies; c) the quality / validity assessment of the included studies; and d) the adequate description of the basic data / studies. Therefore, we asked a panel of three relevant experts in English as a Foreign Language (EFL) and Teaching Chinese as a Foreign Language (TCFL) to evaluate the review protocol of this current research by assigning a scoring sheet (see Appendix A). Each item about the inclusion / exclusion criteria was evaluated by giving a rating of "+1 point" for "Yes", "+0.5 point" for "Partly", and "0 point" for "No". The total score of each question rated by the three experts were respectively: 2.5, 3, 2, 2.5 points, which were acceptable values (Kitchenham and Charters, 2007; CRD, 2009).

2.2 Conducting the review

2.2.1 Identification of research

A large number of relevant studies on ARCS motivation model and flipped classroom together particularly in the context of foreign language learning were examined. To search for the primary studies, the resources including digital libraries and databases were investigated. Taking the reasonable consideration of previous studies on databases for evidence synthesis (e.g., Amarilla et al., 2022; Gusenbauer and Haddaway, 2020; Younger, 2004, 2010) and the characteristics of this current study, SCOPUS, Science Direct, ProQuest, Research Gate, and CNKI[1] were selected. All these large databases are vigorous and high-quality with numerous articles and papers in various subjects.

Following the PICOS (Population, Intervention, Comparison, Outcomes, and Study) framework, introduced by Petticrew and Roberts (2005) and Kitchenham and Charters (2007), "flipped classroom" and "ARCS" were concluded to be the key concepts for literature searching of this study. To search for the articles, we employed the keywords "flipped classroom / learning / approach /

[1] CNKI, short for Chinese Knowledge National Infrastructure, is the biggest online database of academic literatures in China. It has collected 11,215 titles, 65.2 million full-text articles published in mainland China since 1994, with 8,491 academic journals and 1,978 core journals based on Chinese Core Journal Catalogue (2014) in 168 subjects and over 3,000 sub-subjects according to China Library Classification.

pedagogy" and "ARCS (motivation / model)" with Boolean operators in the above five databases. And we set the publishing year "after 2012", because the concept "flipped classroom/learning" was officially proposed by Bergmann and Sams in 2012. After the initial searching, we acquired the 744 available publications in total, including 48 in SCOPUS, 59 in Research Gate, 144 in CNKI, 83 in Science Direct, and 410 in ProQuest. (Table 2)

Table 2: Database search strategy and terms since 2012

Database	Year	Search strategy	Article number (n)
SCOPUS	2012-2023	TITLE-ABS-KEY (("flipped classroom" OR "flipped learning" OR "flipped approach" OR "flipped pedagogy") AND ("ARCS motivation" OR "ARCS model" OR "ARCS theory")	48
Research Gate			59
Chinese Knowledge National Infrastructure (CNKI)			144
Science Direct			83
ProQuest			410
Total (n)			744

2.2.2 Selection of primary studies

After acquiring the primary studies by initial searching, the selection criteria of them should be designed to pinpoint those primary studies offering direct evidence related to the research questions of this current study. To minimize bias, these criteria should be established in the phase of developing review protocol, which can be further modified during the search process. Both inclusion and exclusion criteria should be aligned with the research questions. In accordance with the criteria, we reviewed and examined the studies very carefully and systematically, from the title and key words, and then the abstract, and last to the full texts.

The inclusion criteria of this study for selecting primary studies were as bellow:

1. Year of publication: between 2012 and 2023
2. Literature type: journal articles
3. Language: English, Chinese
4. Document type: full-text articles
5. Empirical studies
6. Studies in the context of foreign language teaching and learning
7. Studies involving both ARCS motivation model and flipped classroom together

And the exclusion criteria were listed as follows:

1. Year of publication: before 2012
2. Literature type: publications not journal articles (book chapters/series, conference proceedings, dissertations, editorials, and other publication types)
3. Language: non-English, non-Chinese
4. Document type: publications with inaccessible full articles
5. Theoretical and academic studies or reviews
6. Studies not related to foreign language teaching and learning
7. Studies involving only one factor of ARCS motivation model and flipped classroom

After the duplications across different databases were removed, we obtained the final selected 12 articles in total, which were fulfilled all the criteria and requirements for the current study. For the detailed selection process, please see the following PRISMA flow diagram in Figure 2:

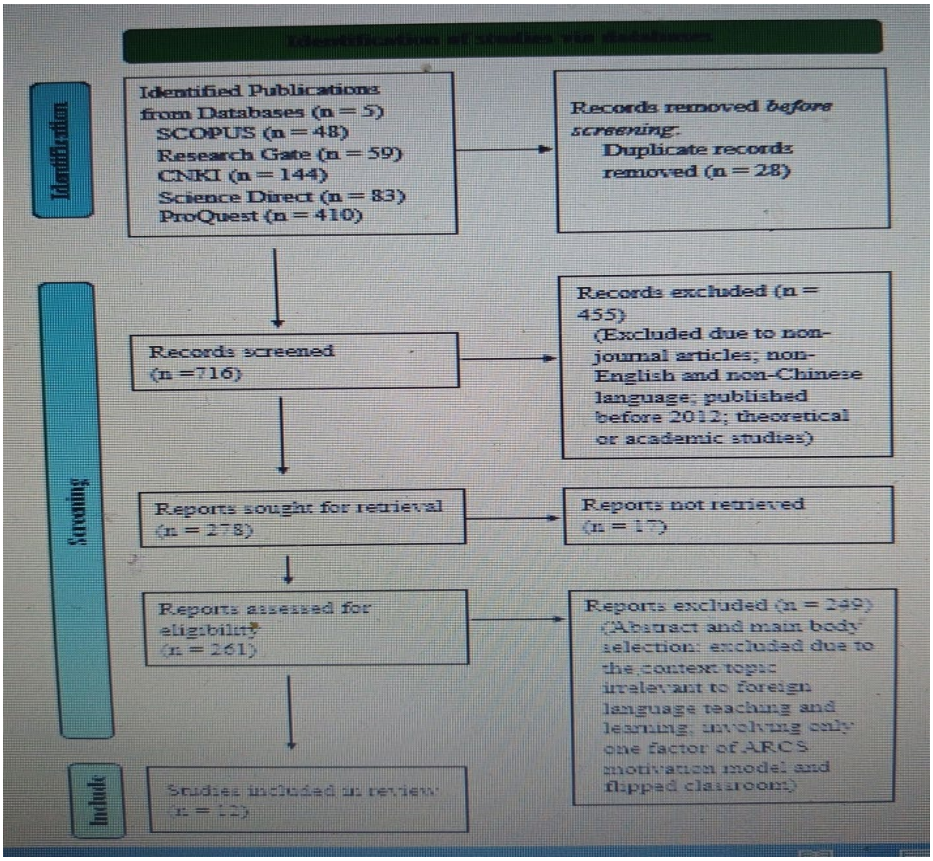

Figure 2: PRISMA flow diagram of selection process

2.2.3 Study quality assessment

According to *CRD's Guidance* (CRD, 2009) for systematic reviews and *Cochrane Reviewers' Handbook* (2003), study quality assessment of the selected primary studies is very critical, which pertains to the degree to which the study minimizes bias and maximizes both internal and external validity. The quality instrument for this current study consisted of the checklists of factors that need to be evaluated for each study, covering different phases of study design, conduct, analysis and conclusions. It was developed from the summary checklists for both quantitative and qualitative studies proposed by Kitchenham and Charters (2007). Each item was assessed by giving a rating of "+1 point", "+0.5 point" and "0 point", indicating the study fully, partially or not answered the checklist question. (Table 3) Consequently, all the 12 selected studies were rated at least +0.5 point for each item, so no article was removed at this phase.

Table 3: A checklist of study quality assessment

Question	**Score**		
	Fully answered (+1)	Partially answered (+0.5)	Not answered (0)
1) Are the study objectives clearly defined?	☐	☐	☐
2) Are the measures used in the study fully defined?	☐	☐	☐
3) Are the study participants or observational units adequately described?	☐	☐	☐
4) Are the data collection methods adequately described?	☐	☐	☐
5) Are all study questions clearly answered?	☐	☐	☐
6) Are the main findings (including negative ones if any) clearly expressed?	☐	☐	☐

2.2.4 Data extraction

Data extraction is to reduce the opportunity for bias. As an single data extractor, I asked my doctoral supervisor to extract data from a random article of the selected 12 studies and verify the results by crosschecking. No inaccurate information was notified.

3. FINDINGS AND RESULTS

3.1 Characteristics and methodologies of the reviewed studies (RQ1)

Through the phase of data synthesis, among the primary studies (n=12), there were 4 quantitative studies (33.3%, Guo et al., 2019; Li, 2018; Mirzaei et al., 2022; Piriyasurawong, 2019), 4 qualitative studies (33.3%, Fu et al., 2020; Hong, 2019; Wu, 2015; Zhao, 2017) and 4 mixed-methods studies (33.3%, Jia et al., 2023; Jong, 2023; Koh and Ahn, 2023; Tokarieva et al., 2021). A total of 6 studies (50%, Jia et al., 2023; Jong, 2023; Koh and Ahn, 2023; Mirzaei et al., 2022; Piriyasurawong, 2019; Tokarieva et al., 2021) were published in English language, and the other half of 6 studies (50%, Fu et al., 2020; Guo et al., 2019; Hong, 2019; Li, 2018; Wu, 2015; Zhao, 2017) were published in Chinese. Most of these studies were conducted in China (n=8, 66.8%), and followed by South Korea, Iran, Thailand and Ukraine (n=1, 8.3% each). Table 4 involved collecting, analyzing and summarizing the characteristics and results of the selected studies.

Table 4: Analysis of the characteristics and results of the primary studies

Author(s) and Location	Subject Area	Educational Setting	Participants	Variables/Construct	Study Aim(s)	Outcomes
Quantitative Study (n=4)						
Guo et al., 2019 *China*	English (advanced level)	Higher education	Sample: 60 4th-year students (experimental group: n=30; control group: n=30)	Independent: the teaching model based on We-chat and micro-lessons in advanced English flipped classroom; conventional teacher-based lecture model Dependent: post-test scores of English proficiencies; motivation levels Survey: pre- and post- questionnaire on students' motivation levels (post-questionnaire for experimental group only) Interview: 3 participants of experimental group	1) To develop an effective teaching model based on We-chat and micro-lessons in flipped classroom 2) To examine effects of this developed model on improving students' interest and motivation	1) This study proposed a teaching model based on We-chat and micro-lessons in English language flipped class. 2) The teaching model based on We-chat and micro-lessons in flipped classroom significantly enhanced students' English proficiency and motivation than the convectional lecture.
Li, 2018 *China*	Japanese	Higher professional education	Sample: 71 3rd-year students (experimental group: n=36; control group: n=35)	Independent: the flipped teaching model based on ARCS motivation and Bloom's taxonomy; conventional teacher-based lecture model Dependent: pre- and post-tests scores of Japanese proficiencies	To explore the effects of flipped classroom on students' learning achievements, motivation and initiative.	1) This study proposed a flipped based on ARCS motivation and Bloom's taxonomy for business Japanese course. 2) Students learning achievements were significantly enhanced in flipped setting. 3) The survey results showed most students (65%) like

						the flipped classroom that can improve learning motivation, initiative and engagement.
Mirzaei et al., 2022 *Iran*	English (writing course)	Higher education	Sample: 59 EFL learners (experimental group: n=31; control group: n=28)	Independent: ARCS-flipped setting; ARCS-face-to-face setting Covariate: English expository-writing pretest scores Dependent: English expository-writing post-tests scores; learning motivation Semi-structured interviews: 31 learners in the ARCS-flipped setting	1) To probe the effects of integrated-ARCS-flipped teaching on EFL learners' expository-writing skills and motivation 2) To grasp learners' perceptions towards the integrated-ARCS-flipped writing instruction	1) The ARCS-based flipped teaching enhanced EFL learners' expository-writing skills and learning motivation levels significantly. 2) 75% of the learners expressed positive attitudes towards the ARCS-flipped teaching, including self-interest, flexibility, collaboration, learner-centeredness, classroom atmosphere, motivation, etc.
Piriyasura-wong, 2019 *Thailand*	Spanish (communication course)	Higher education	Population: 68 underground students Sample: 46 students by purposive sampling technique	Independent: AL-ARCS on SC Model; Spanish for communication course Dependent: learning achievement scores on communicative skills in Spanish	To design AL-ARCS on SC Model, in order to enhance students' communicative skills in foreign language	1) This study developed the AL-ARCS on SC Model in Spanish communication course, and defined activities, expectation and assessment method/tool. 2) Students' learning achievements were enhanced with this model.
Qualitative Study (n=4)						
Fu et al., 2020 *China*	Business English (visual-audio-oral course)	Higher education	Population: 2nd-year undergraduate students (n=160) Sample: a subset of population (n=N/A)	Interview: one-on-one pre-interviews with a subset of the participants (n=N/A) Survey: a pre-questionnaire based on ARCS motivation model on students' motivation levels (n=160, collecting 143 valid responses)	1) To developed an effective flipped classroom model based on ARCS motivation for Business English visual-audio-oral course 2) To grasp students' perceptions of the original course and to identify factors influencing students' learning motivation,	1) This study proposed a course design proposal based on flipped classroom and ARCS motivation for Business English visual-audio-oral course. 2) Monotonous instructional approach, insufficient interaction between teachers and students, limited class hours were found to be main factors influencing students'

						learning motivation and outcomes.
Hong, 2019 *China*	English (advanced level)	Higher education	3rd-year undergraduate students majoring in English (n=N/A)	Case study: an instructional design of pre-class tasks in flipped English class for a teaching unit was conducted in a particular university in North China	To examine the effects of the principles for designing and assigning pre-class tasks in Advanced English flipped class on students' autonomous learning and class efficiency	1) This study suggested the techniques of designing and assigning pre-class tasks in Advanced English flipped class. 2) This study identified and explained the common issues and potential problems in the design and assignment process of the developed techniques.
Wu, 2015 *China*	English (listening and speaking course)	Higher education	Population: 1st-year non-English major graduates (n=N/A)	Case study: a modified flipped English listening and speaking class based on U-MOOC Longman English learning platform was conducted as an experiment in a particular university in North China. Interview: a group interview with a subset of the participants (n=N/A)	To explore the instructional design of pre-class tasks based on ARCS motivation in flipped classroom in English listening and speaking course to improve teaching efficiency	1) This study proposed an instructional design of pre-class tasks based on ARCS motivation in flipped classroom in English listening and speaking course. 2) Students' attitudes towards the instructional design of pre-class tasks in flipped setting were positive.
Zhao, 2017 *China*	Business English (speaking course)	Higher professional education	N/A	Interview: a pre-interview with related experts in business and education (n=N/A) Literature review: flipped classroom in China and abroad	To probe the effects of the instructional design of task-driven flipped classroom in Business English course on students' learning outcomes	1) This study proposed an instructional design of task-driven flipped classroom model based on ARCS motivation, Bloom's taxonomy and Learning Pyramid in Business English speaking course. 2) The professional core competencies of Business English majors, relevant courses and job tasks were summarized.
Mixed-methods Study (n=4)						
Jia et al., 2023 *China*	English	Higher education	Sample: 80 1st-year undergraduate students	Quantitative: quasi-experiment with both pre- and post-tests of	1) To investigate the effects of the flipped SEF-ARCS decoding	1) This study developed and evaluated the flipped

			(experimental group: n=44; control group: n=36)	dictation/decoding and listening proficiency Qualitative: a post-treatment open-ended survey to explore the results of the quantitative study Pilot study: a case study using an open-ended survey on EFL university graduates for their perceptions about the flipped model (n=25) Literature review: listening decoding, flipped classroom, ARCS motivational model	model on students' decoding skills and listening proficiency 2) To probe students' attitudes towards the flipped SEF-ARCS decoding model	SEF-ARCS decoding model for EFL listening decoding training. 2) The flipped SEF-ARCS decoding model significantly support EFL students' decoding skills and listening proficiency. 3) Students' attitudes towards the flipped SEF-ARCS decoding model were positive.
Jong, 2023 *Hong Kong, China*	Language education	Higher education and pre-service teacher education	188 post-graduate education students (i.e., pre-service teachers): language education major (n=65), social and humanities education major (n=61), mathematics and science education major (n=62))	Quasi-experiment: 4 consecutive cohorts study, with nonequivalent control group and only post-questionnaire on motivation(IMMS) Interview: semi-structured group interviews of 12 participants (4 in each cohort), to supplement the quantitative IMMS results	To explore the ARCS motivational affordances of SV-IVR instructional methods and media with greater motivational power to support out-of-class phase of flipped classroom	1) The Participants across the 3 majors positively perceived SV-IVR as having desirable benefits on Attention, Relevance, and Satisfaction of ARCS, except Confidence. 2) SV-IVR was found to be a pragmatical and useful tool in the context flipped classroom in pre-service teacher education, especially during Covid-19 pandemic.
Koh and Ahn, 2023 *South Korea*	Hindi (basic level)	Higher education	52 students	Quantitative: quasi-experiment with nonequivalent control group and only post-questionnaire on motivation (IMMS) Qualitative: 2 focus group interviews, with each consisting of 2 graduate students, to explain the results of quantitative questionnaire surveys	1) To understand the characteristics of the video lectures to engage students in flipped learning 2) To grasp students' perceptions on traditional video lectures produced by the instructor alone 3) To examine the effects of student-engaged video lectures in flipped learning on motivation and the reason(s)	1) The student-engaged video lectures in flipped learning could NOT strengthen students' motivation significantly (except for slight changes in Attention and Relevance of ARCS regardless of students' grades). 2) The reasons for the findings above might be negative effects of student-engaged video lectures on teaching style,

						sustainable motivation, concentration, comparing among peers, etc.
Tokarieva et al., 2021 *Ukraine*	N/A	Higher education	Sample: 30 instructors and 23 students from 1st-3rd years	Literature review: the definitions, history, characteristics, quality parameters, and models of "distance learning" and "e-learning" Quantitative: a) A questionnaire "Distance Learning Mode of Work Satisfaction / Dissatisfaction" for students (n=1082, including 20 samples and 1062 university students) b) IMMS survey on students' motivation (n=23) Qualitative: a form "Analysis of the Distance Learning Tools Preferences" for teachers (n=30)	1) To analyze the e-learning modes and measure their efficiency 2) To propose the most effective model and the ways of e-learning integration into foreign language learning in higher education	1) The most popular and effective technologies and tools for e-learning and distance learning of foreign languages were summed up, e.g., Zoom, Skype, Viber, etc. 2) A majority of the students (n=19, 82.6%) showed medium motivation levels and above for the e-learning language courses, which would differ with different courses / instructors / syllabus. 3) Flipped classrooms were mentioned to be suitable for digital learning environment, but no in-depth discussion.

N/A=not applicable

N/S=not specified

EFL=English as a Foreign Language

AL-ARCS on SC Model=Active Learning Using ARCS Motivation on Social Cloud Model

IMMS= Instructional Materials Motivation Survey by John Keller

SEF= suitability, exploration, feedback

SV-IVR= spherical video-based immersive virtual reality

3.2 Prevailing Tools and Technologies Applied in the Reviewd Studies (RQ2)

The prevailing tools and technologies applied in the primary studies to implement the integration of flipped classroom and ARCS motivation model in foreign language learning can be mainly divided into three major categories (Table 5):

(1) online learning platforms and tools: WeChat Official Accounts, Edmodo, SV-IVR, Skype, Zoom, Viber, Blog, Mosoink Cloud Class, U-MOOC;
(2) social networking media: WeChat Group & Moments, Facebook, Telegram, Viber, email service, QQ Group[2];
(3) digital resources: videos / video clips, PPT, Micro-lessons, E-documents, etc.

[2] QQ Group refers to a feature within the QQ messaging platform. QQ is a widely used instant messaging software developed by the Chinese company Tencent. In QQ, users can create or join groups for communication and collaboration.

However, some of these tools and technologies were not limited to one particular category, for instance, Facebook worked as both a social network to share knowledge or opinions and interact with others, and a Cloud storage for learners (Piriyasurawong, 2019); Edmodo was used as a synchronous learning platform, a LMS and a cloud-based social medium (Mirzaei et al., 2022; Tokarieva et al., 2021).

Table 5: Prevailing tools and technologies in integrating flipped classroom with ARCS motivation model in foreign language learning

Tools and Technologies		**Article(s)**
Category	**Name**	
1) Online learning platforms and tools	WeChat Official Accounts	Guo et al. (2019), Zhao (2017) (n=2)
	Edmodo	Mirzaei et al. (2022) (n=1)
	SV-IVR (spherical video-based immersive virtual reality)	Jong (2023) (n=1)
	Skype, Zoom, Viber	Tokarieva et al. (2021) (n=1)
	Khaoot!, Nearpod, Google Classroom	Jong (2023) (n=1)
	Blog	Zhao (2017) (n=1)
	Mosoink Cloud Class	Fu et al. (2020) (n=1)
	U-MOOC	Wu (2015) (n=1)
2) Social networking media	WeChat Group & Moments	Guo et al. (2019), Wu (2015) (n=2)
	Facebook	Piriyasurawong (2019) (n=1)
	Telegram, E-mail service	Tokarieva et al. (2021) (n=1)
	QQ Group	Wu (2015) (n=1)
3) Digital resources	Videos / video clips	Fu et al. (2020), Guo et al. (2019), Hong (2019), Jia et al. (2023), Koh and Ahn (2023), Li (2018), Zhao (2017), Piriyasurawong (2019), Tokarieva et al. (2021) (n=9)
	Micro-lessons	Fu et al. (2020), Guo et al. (2019), Hong (2019) (n=3)
	E-documents	Hong (2019), Li (2018), Piriyasurawong (2019), Zhao (2017) (n=3)
	PPT	Koh and Ahn (2023), Li (2018) (n=2)

3.3 Effects and outcomes of the reviewed studies (RQ3)

To sum up, most of the study effects and outcomes were positive, primarily manifested as follows:

1) **Enhanced learning performance and achievements.** Guo et al. (2019) proposed a flipped teaching model based on ARCS motivation theory through We-chat and micro-lessons in Advanced English course, and found students got higher scores in learning achievement than the control group with a traditional instructional method. Jia et al. (2023) reported the experimental group with the flipped SEF-ARCS decoding model performed significantly better than their counterparts without the model in terms of decoding skills and English listening proficiency. Li (2018) concluded the students in the flipped setting outperformed other students in the conventional setting and themselves in the business Japanese language proficiency test, and also better than themselves in the pre-test. Similarly, Mirzaei et al. (2022) showed the ARCS-flipped group did better than the face-to-face group in their English writing performance. Piriyasurawong (2019) stated that learning achievement (i.e., Spanish communication skills) of the students after applying AL-ARCS on SC model in flipped setting was higher than before, and higher than the criteria set at 80%.

2) **Improved learning motivation levels.** Jong (2023), Koh and Ahn (2023), and Tokarieva et al. (2021) used the IMMS online survey by John Keller to measure motivation levels of

students with integrating flipped classroom with ARCS motivation model. Tokarieva et al. (2021) noted that participants' motivation levels improved significantly in the 4 factors of Attention, Relevance, Confidence and Satisfaction; while Jong (2023) reported the significant improvement on the other 3 factors, but not "C (Confidence)", and Koh and Ahn (2023) only found the significant improvement on Attention and Relevance. According to Mirzaei et al. (2022), revealed that the flipped course resulted in greater enhancements in learners' post-intervention ARCS-based interest and motivational dimensions compared to the face-to-face course, by conducting the ARCS-based Course Interest Survey (CIS) by Keller and Subhiyah (1993).

3) Positive perceptions and attitudes. Jia et al. (2023) conducted a post-treatment open-ended survey to gain students' perceptions of the flipped SEF-ARCS decoding model, which turned to out be positive. Most students stated they enjoyed the material selections, phonetic knowledge, lucid teacher's explanation videos and helpful daily English listening tasks. Mirzaei et al. (2022) conducted semi-structured interviews with both the experimental and control group regarding their attitudes towards the related instructional contexts. More than half of the responses were positive due to the flipped features of higher-class effectiveness, flexibility, learner autonomy, teacher / peer support, classroom atmosphere, motivation, etc. Koh and Ahn (2023) conducted two focus group interviews to explain the main reasons that Student-Engaged Video Lecture (SEVL) affected two factors (Attention and Relevance) of ARCS motivation were higher course interest and streamlined flipped learning activities. Through different rounds of questionnaire surveys and interviews, Tokarieva et al. (2021) acquired positive perceptions from both students and teachers towards the ARCS-based flipped approach in distance learning and e-learning. Guo et al. (2019) and Li (2018) conducted a post-treatment self-designed questionnaire survey on the experimental group, indicating students had higher acceptance and satisfaction with the ARCS-based flipped classroom because it led to Increased engagement, learning interest, initiative, autonomous learning, etc.

4. DISCUSSION AND CONCLUSIONS

Among the 12 reviewed empirical articles, the integration of flipped classroom and ARCS motivation model primarily occurred through two methods: 1) to develop a flipped classroom model theoretically based on ARCS motivation as an innovative pedagogical strategy for foreign language learning (Guo et al., 2019; Hong, 2019; Jia et al., 2023; Jong, 2023; Mirzaei et al., 2022; Li, 2018; Piriyasurawong, 2019; Zhao, 2017); 2) to take ARCS motivation model as the criteria and reference for evaluating the designed flipped classroom model in foreign language learning (Fu et al., 2020; Koh and Ahn, 2023; Tokarieva et al., 2021; Wu, 2015). Furthermore, the fundamental themes of the reviewed articles were concluded, namely, language learning performance and achievements, participants' perceptions and attitudes, design of flipped classroom model, and instructional technologies and tools. And these four fundamental themes were further divided into several more specific sub-themes. (Figure 3)

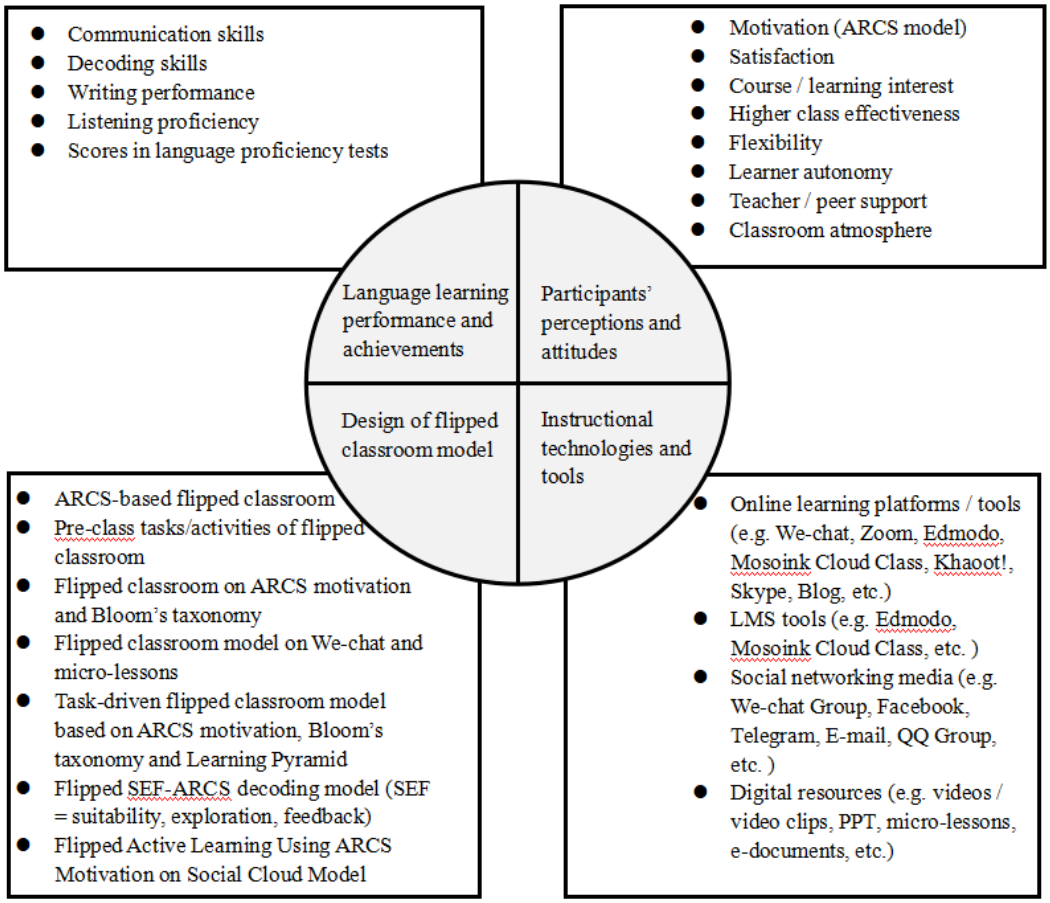

Figure 3: Synthesis and induction of research themes

Firstly, in terms of foreign leaning, all the reviewed studies indicate that the integration of the flipped classroom and the ARCS motivation model can enhance foreign language learners' proficiencies and skills, as evidenced by significant improvements in their test scores or task performance. However, the existing research on language skills has only covered listening, speaking, and writing, with no studies addressing reading skills. This may be due to the challenges of effectively monitoring individual understanding during independent reading time and creating engaging and effective pre-reading materials, such as videos or interactive activities, in listening or speaking courses. If the flipped classroom is improperly structured, it may also result in limited peer interaction and collaboration.

Secondly, in the application of instructional technologies and tools, a wide variety of tools have been utilized, such as online learning platforms and social media. However, regional limitations exist. For example, in China, social media platforms like WeChat and QQ are more widely used than Facebook which is banned in China. This means that expanding teaching to regions outside of China requires adopting other tools. Some studies have shown that different technological tools are used in various phases or tasks of flipped classrooms, with some classes employing more than five tools in a single session. This undoubtedly increases the preparation workload for teachers and adds complexity and difficulty for students, potentially reducing their learning interest and confidence. Therefore, designing globally applicable, multifunctional, and user-friendly educational technology tools in the future could positively impact foreign language teaching and learning motivation.

Thirdly, in the context of ARCS motivation model, 11 of the reviewed 12 studies concluded that the integration of the flipped classroom and the ARCS model could enhance learning motivation levels, particularly in the aspects of Attention (A), Relevance (R), and Satisfaction (S). However, one study pointed out that the Confidence (C) aspect was less significant (Jong, 2023). It can be reasonably inferred that this is due to the subjective nature and difficulty in measuring the elements of Self-growth and Personal Control within the "Confidence (C)" dimension, as well as the lack of timely and effective feedback in certain flipped classrooms. Additionally, only one study suggested that the

integration of the flipped classroom and the ARCS motivation model had no impact on the motivation levels across all four ARCS dimensions (Koh and Ahn, 2023). This could be attributed to factors such as teaching style, students' individual focus levels, or other external reasons.

Additionally, the educational settings of all the reviewed studies were in higher education. While this creates certain limitations in the research scope, it aligns with the characteristics of the flipped classroom. Compared to pre-university education, higher education or adult learners tend to have stronger self-paced learning and management skills, enabling them to use pre-class and post-class time more effectively for independent learning. Moreover, classroom management and extracurricular assessments are relatively easier for teachers, making higher education more feasible for implementation. However, in future research and teaching, expanding the scope of participants and educational settings, and designing more effective flipped classrooms for foreign language learning that integrate the ARCS motivation, will be of greater significance.

4.1 Implications

Some significant implications for exploring and applying the integration of ARCS motivation model and flipped classroom in foreign language teaching and learning were acquired. Firstly, these researches on flipped classroom and ARCS motivation model aligned with the new trends of 21st century foreign language teaching and technology-enhanced learning, including student-centered learning, autonomous learning, widespread utilization of online resources, platforms and high-technology. Language learners' initiative, participation, subjectivity, self-confidence, satisfaction, collaboration, as well as their learning performance and achievements turned out to be all effectively stimulated and enhanced in the reviewed studies.

Secondly, the findings of this current study also had certain and significant practical implications, which may to some extent address the following issues: learners in regions with underdeveloped foreign language teaching resources who wish to enhance their language learning, or individuals aspire to learn or teach a foreign language but cannot participate in face-to-face offline language classes due to various reasons such as work restrictions, personal schedule constraints, or other unavoidable social factors like the COVID-19 pandemic.

Additionally, this systematic literature review provided valuable references for my doctoral project in integrating ARCS motivation model with flipped classroom to enhance foreign language listening skills, including theoretical background, the design and application of integrating flipped classroom with ARCS motivation model, experimental design, research framework and methodology, etc. To specify the research methodology in particular, the mixed research methodology held great value for reference, being quite comprehensive and reasonable. A quantitative method can be used to collect and analyze the test scores for listening skills and learners' motivation levels, and a qualitative method is more suitable for obtaining learners' in-depth attitudes and perceptions.

4.2 Limitations and future directions

Regarding the limitations of this present study, the most apparent one must be the search phase. We conducted the search solely in five databases, namely, SCOPUS, Science Direct, ProQuest, Research Gate, and CNKI, which may have excluded other scientific literature not indexed in these databases, as well as other forms of publication like book chapters, conference proceedings and high-quality dissertations. And other relevant literature was omitted in languages other than Chinese and English due to the educational background of our team. Moreover, the searching keywords did not include "inverted classroom / learning", which may affect the results of the selection of primary studies. In addition, it was difficult to say the quality assessment of the primary studies was perfectly flawless, and further improvement would be possible in minimizing bias and maximizing both internal and external validity.

Therefore, for the future studies, so more high-quality databases and types of publications could be reviewed, and different criteria may lead to slightly different searching results. Based on the findings of this systematic literature review, future studies may need to explore the integration of flipped classroom and the ARCS motivation model from more various perspectives, designs, and implementation methods to achieve more effective implementation in foreign language teaching and learning. Additionally, due to the profound and undeniable impact of the COVID-19 pandemic since 2019, future review studies could be divided into three stages: pre-pandemic, during the pandemic,

and post-pandemic, comparing and analyzing the research findings across different stages to investigate the effectiveness of flipped classroom and ARCS motivation model in foreign language teaching and learning at different stages.

Authors' contributions

JY conceived the idea, designed the project, conducted the review process and wrote the manuscript. SP supervised and validated the review process, and edited the manuscript.

JS helped reviewing the manuscript. All authors read and approved the final manuscript.

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APPENDIX A

Scoring sheet for evaluating the review protocol

The evaluation of each Systematic Literature Review (SLR) will be conducted according to the criteria from the Centre for Reviews and Dissemination (CRD) Database of Abstracts of Reviews of Effects (DARE), York University. These criteria revolve around four key questions and are assigned scores in the sheet bellow:

Question	Scoring Procedure			Total Score
1) Are the review's inclusion and exclusion criteria described and appropriate?	☐ **Yes (+1):** The inclusion criteria are explicitly defined in the paper.	☐ **Partly (+0.5):** The inclusion criteria are implicit.	☐ **No (0):** The inclusion criteria are not defined and cannot be readily inferred.	
2) Is the literature search likely to have covered all relevant studies?	☐ **Yes (+1):** The authors have either searched 4 or more digital libraries and included additional search strategies.	☐ **Partly (+0.5):** The authors have searched 3 or 4 digitals libraries with no extra search strategies.	☐ **No (0):** The authors have search up to 2 digital libraries or an extremely restricted set of journals.	
3) Did the reviewers assess the quality/validity of the included studies?	☐ **Yes (+1):** The authors have explicitly defined quality criteria and extracted them from each primary study.	☐ **Partly (+0.5):** The research question involves quality issues that are addressed by the study.	☐ **No (0):** No explicit quality assessment of individual papers have been attempted.	
4) Were the basic data/studies adequately described?	☐ **Yes (+1):** Information is presented about each paper.	☐ **Partly (+0.5):** Only summary information is presented about individual papers.	☐ **No (0):** The results of the individual studies are not specified.	