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The Effect of Flipped Classroom on EFL Students' Reading Comprehension and their Reading Motivation Levels

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ABSTRACT

The Flipped Classroom (FC) approach has the potential to enhance EFL students' reading comprehension and motivation; however, its effectiveness remains under-researched. This study employed a quasi-experimental method using a non-equivalent control group design to examine the effect of the Flipped Classroom on EFL students' reading comprehension and motivation. Two classes were randomly assigned as the experimental and control groups, each consisting of 35 students, with the FC treatment applied only to the experimental group. Research instruments included a reading comprehension test, a reading motivation questionnaire, and interviews to explore students' perceptions of FC implementation. Pre-test results indicated no significant differences between the experimental and control groups in either reading comprehension or motivation. However, after the treatment, the experimental group using the Flipped Classroom showed significant improvement in both aspects. Student responses also indicated that the approach improved their focus, independence, and understanding of texts. The Flipped Classroom model was proven to significantly improve EFL students' reading comprehension and motivation, with higher post-test scores and positive student responses toward interactive and independent learning. Therefore, FC is a promising and effective technology-based approach for teaching reading in EFL classrooms.

Keywords: Flipped Classroom, Reading Comprehension, Reading Motivation, EFL Learners, Quasi-Experimental Design

INTRODUCTION

Reading comprehension skills play a vital role in students' academic success and daily lives. In an English as a Foreign Language (EFL) senior high school setting, these skills are especially critical for learning across subjects. Strong reading abilities enable students to access, analyze, and interpret a wide range of texts, including textbooks, research articles, literary works, and digital media. These skills help learners extract key information, understand complex concepts, and critically evaluate arguments (Graham et al., 2020). For instance, in science classes, EFL students must comprehend research findings, interpret graphs, and analyze experimental procedures (Liu et al., 2024). In social studies, they are expected to evaluate historical documents, compare different perspectives, and construct well-reasoned arguments based on textual evidence (Çal & Demirkaya, 2020). Meanwhile, in literature classes, students analyze themes, character development, and rhetorical devices to deepen their understanding of texts (Burns et al., 2023).

Despite its importance, many EFL students continue to face difficulties in reading comprehension. This issue has been widely documented and remains a concern in current research (BARNETT, 1988; khellab et al., 2022;

Samiei & Ebadi, 2021; Seedanont & Pookcharoen, 2019; WANG & GUTHRIE, 2004). Several internal factors contribute to these challenges, including limited vocabulary (Ibhar, 2022; Masrai, 2019), lack of reading strategies (Hamra & Syatriana, 2010) (Babashamasi et al., 2022), weak critical thinking skills, and poor ability to predict main ideas (Bridges et al., 2023). Low motivation (Tezol et al., 2022)-(Ahmed, Ampry, et al., 2022; Webber et al., 2023), limited background knowledge (Anyiendah et al., 2021; Smith et al., 2021), and over-reliance on teacher assistance (Opdenakker, 2022), further hinder students' progress. External factors, such as ineffective teaching methods (Al Adawiyah, 2023), inappropriate reading materials (van Wyk, 2021), limited instructional time (Nurdianingsih, 2021a), and insufficient use of technology (van Wyk, 2021) also play a role. In addition, psychological and cultural barriers, such as reading anxiety (Al-Obaydi et al., 2024), low self-confidence (Peura et al., 2019), and unfamiliarity with cultural contexts in texts (Smith et al., 2021), can intensify the difficulties EFL learners experience when reading in English.

These challenges are interrelated in influencing the success of EFL learners' reading comprehension. To begin with, internal elements, including limited vocabulary (Ibhar, 2022; Li & Gan, 2022), show that learners with limited vocabulary often have difficulties understanding more complex texts, especially when the text contains technical or idiomatic terms. A study by (Li & Gan, 2022) emphasized that a rich vocabulary is an important foundation for developing in-depth reading skills. Lack of reading strategies (Hamra & Syatriana, 2010) (Babashamasi et al., 2022), such as skimming or scanning, makes students unable to determine important information in the text, thus increasing the reading duration without optimal results. As a result, students feel frustrated and give up quickly. Meanwhile, low critical thinking skills (Sari & Prasetyo, 2021) hinder students from evaluating information in the text or drawing logical conclusions (Erbeli & Wagner, 2023). The low ability to predict the main idea of the text also has a negative impact on the speed and accuracy of students' understanding (Erbeli & Wagner, 2023), which can result in low academic grades and self-confidence.

Low motivation further exacerbates the situation, as unmotivated students tend to put less effort into the reading difficulties (Webber et al., 2023)(Ahmed, Ampry, et al., 2022; Ahmed, Kumar, et al., 2022). Research by (Ahmed, Kumar, et al., 2022) shows that students with low motivation tend to have minimal engagement in the learning process, which impacts the development of their literacy skills. The inability to overcome these challenges can create a negative cycle, where poor reading achievement lowers motivation, reducing students' engagement with texts and further hindering their reading development. On the other hand, limited background knowledge (Smith et al., 2021) (Anyiendah et al., 2021) makes it difficult for students to understand texts that require specific contexts, such as specific history or culture, thus reducing their absorption of the material. Excessive dependence on teacher assistance (Opdenakker, 2022) is also a major barrier; Students who rely too much on teachers do not develop independent learning skills, which ultimately limits their ability to comprehend texts independently and hinders their overall skill development.

From an external perspective, irrelevant teaching methods (Al Adawiyah, 2023) and inappropriate reading materials—such as texts that do not align with students' language proficiency, are not contextually relevant, or fail to stimulate interest (van Wyk, 2021) —result in students feeling uninterested or disinterested in comprehending texts. For example, (Al Adawiyah, 2023) found that traditional methods that do not involve contextual or interactive approaches fail to motivate students to read, potentially creating resentment towards the learning material. Limited teaching time (Nurdianingsih, 2021b) limits students' opportunities to practice reading, and the lack of integration of modern technology (van Wyk, 2021) hinders the utilization of digital resources that can enhance students' learning experiences. Without more innovative approaches, students will continue to feel trapped in ineffective learning patterns, which in turn can lead to decreased interest and overall academic performance.

The various factors mentioned above are interrelated in determining the success of EFL students' reading comprehension. One factor that plays a crucial role in this process is reading motivation. Reading motivation not only influences how often students read, but also determines the extent to which they are actively involved in understanding and analysing texts. Students with high reading motivation tend to be more persistent in dealing with challenging texts, use more effective reading strategies, and have a greater curiosity about the content of the reading (Chen et al., 2022; Ismail et al., 2023; Liu et al., 2024; WANG & GUTHRIE, 2004)(Hu et al., 2022). (WANG & GUTHRIE, 2004) explained that intrinsic motivation to read, such as curiosity and personal satisfaction, increases students' engagement in reading activities, while extrinsic motivation such as rewards or academic grades can also provide additional encouragement. (Ahmed, Ampry, et al., 2022) research show that students with low reading motivation tend to have minimal engagement in the learning process, which worsens their literacy skills. Furthermore, (Webber et al., 2023) found that students with high reading motivation are better able to overcome obstacles such as limited vocabulary and low reading strategies, because they are more motivated to use a variety of resources and strategies to understand the text. Students who have high reading motivation also reduce reading anxiety (Al-Obaydi et al., 2024), because students feel more confident and able to face the challenges of reading difficult texts. Furthermore, a learning environment that supports reading motivation also reduces

students' dependence on teacher assistance (Opdenakker, 2022), encouraging them to become more independent learners. Thus, increasing reading motivation not only helps students overcome internal problems such as limited vocabulary and inadequate reading strategies, but also overcome external barriers such as lack of relevant materials and limited teaching time.

Various reading instruction methods in EFL classrooms have demonstrated their effectiveness, such as Reciprocal Teaching, Task-Based Instruction, Think-Aloud Protocol, and Extensive Reading (Widodo, 2016). However, despite the diversity of approaches, EFL students still face a number of common obstacles that hinder the effectiveness of reading instruction. Some of these include limited time for in-depth exploration of texts in class, which often results in learning focusing only on the surface of the text and not sufficiently developing students' inferential and evaluative skills (Dalacosta et al., 2011). Furthermore, limited academic vocabulary is also a significant barrier, as students struggle to understand expository texts and scientific arguments due to a lack of relevant lexical knowledge (Faridh F et al., 2019). Equally important, differences in background knowledge among students also influence the process of interpreting texts, especially when students lack adequate schemata to connect new information to prior knowledge (Kendeou et al., 2016). Furthermore, collaborative methods such as Reciprocal Teaching rely heavily on students' discussion skills and, in practice, often lead to dominance by more active students, resulting in not all students receiving equal learning benefits (Nasr, 2022).

These challenges contribute to low cognitive engagement and limited reading comprehension, which indirectly impacts their reading motivation. When students feel unable to fully understand a text or feel marginalized in collaborative learning processes, their self-efficacy and interest in reading tend to decline (Chen et al., 2022; Ismail et al., 2023; WANG & GUTHRIE, 2004). A lack of confidence and personal meaning in reading activities can weaken the intrinsic drive to read, thus reducing the quality of their interactions with the text. Therefore, the Flipped Classroom (FC) approach emerged as a relevant alternative solution. Through this model, material is delivered outside of class via video or digital materials, giving students the opportunity to construct initial understanding independently. Class time is then optimally utilized for directed discussions, clarification of meaning, and collaborative reading strategy practice. This approach not only encourages learning autonomy and active participation but also provides space for educators to facilitate equitable understanding in a more interactive and meaningful setting (Zainuddin & Halili, 2016) (Hilmarsdottir et al., 2018).

The FC model offers a promising approach to support both reading comprehension and reading motivation, especially in EFL contexts. By shifting the initial exposure to reading materials outside the classroom through videos or guided texts, students are given more time to engage with content at their own pace, allowing for deeper processing and repeated exposure, which are critical for comprehension (Zainuddin & Halili, 2016) (El-Esery, 2023; Hilmarsdottir et al., 2018). This flexibility helps reduce cognitive pressure during classroom sessions and enables learners to activate background knowledge before class discussions (Seedanont & Pookcharoen, 2019). Moreover, FC promotes active learning through interactive in-class activities such as group discussions, problem-solving tasks, and collaborative analysis, which encourage students to apply and reflect on what they have read (Li & Gan, 2022). These social and student-cantered experiences can enhance motivation by increasing learners' sense of autonomy, competence, and relevance in learning (Hu et al., 2022).

The implementation of the FC approach generally follows two main phases: the pre-class phase and the in-class phase. In the pre-class phase, teachers provide reading materials or introductory videos designed to introduce reading strategies such as skimming, scanning, or making inferences. Students are expected to read or watch these materials independently before the face-to-face session, enabling them to build initial understanding of the topic and the structure of the text (El-Esery, 2023; Hilmarsdottir et al., 2018). The in-class phase then focuses on higher-order activities such as collaborative discussions, text clarification, and the application of metacognitive strategies like think-aloud and text annotation. This process aligns with the constructivist approach, in which learners actively construct meaning through social interaction and reflection on their prior learning experiences (L. S. Vygotsky, 2020) (Li & Gan, 2022). Thus, the Flipped Classroom in reading instruction serves as a pedagogical approach that balances autonomous and collaborative learning, while promoting a higher level of cognitive engagement compared to traditional models.

In addition, many studies on the FC model tend to focus primarily on the pre-class and in-class stages, while the post-class phase is often overlooked or underexplored (Hu et al., 2022) (El-Esery, 2023; Hilmarsdottir et al., 2018). The post-class stage plays a critical role in reinforcing learning and ensuring the continuity of students' cognitive engagement beyond the classroom. Post-class activities such as reflective writing, follow-up assignments, online discussion forums, or formative quizzes help solidify content retention, promote critical thinking, and allow students to assess their own understanding (Zainuddin & Halili, 2016) (Li & Gan, 2022). In reading instruction, post-class activities are especially valuable for encouraging students to synthesize information, write responses to texts, or connect textual ideas to real-life contexts (Thomas & Kim, 2019). Moreover, the post-class phase provides opportunities for differentiated learning through additional feedback or scaffolding, which can be particularly helpful for struggling readers (Ahmed, Ampry, et al., 2022; Masrai, 2019). Without proper implementation of post-

class support, the effectiveness of the flipped model may be diminished, as students miss out on a crucial stage of internalizing and applying what they have learned. Therefore, there is a need for more holistic and comprehensive research that includes post-class activities as an integral part of the FC instructional design.

Moreover, the researcher utilized the VOSviewer program. The articles analyzed were indexed in Scopus, as Scopus is recognized as a credible indexing database. A total of 300 documents were retrieved from Scopus.com using the keyword *Flipped Classroom* within the publication range of 2015 to 2025. Similarly, 300 documents were collected using the keyword *Reading Comprehension*, and another 300 documents were retrieved using the keyword *Reading Motivation*. Thus, a total of 900 documents were analyzed using VOSviewer. The results of the analysis using the VOSviewer program are presented as follows.

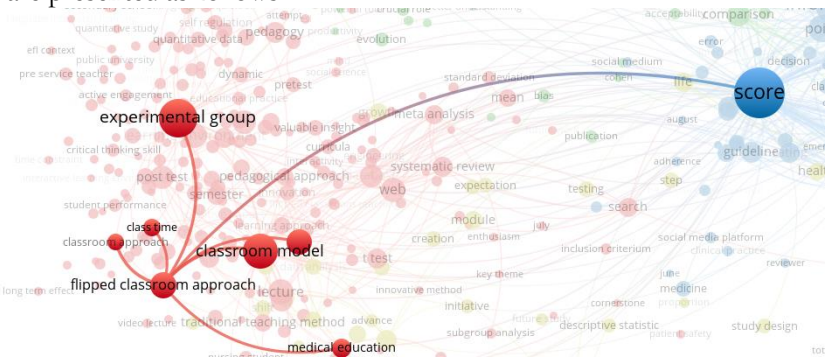

Figure 1. Relationship between "Flipped Classroom" and Experimental Variables

The first figure displays a visualization of the relationship between the flipped classroom approach and elements of quantitative research in the education domain. It can be seen that the terms "flipped classroom approach, " "classroom model," and "experimental group" are the main nodes (large nodes) that are closely interconnected, indicating that innovative learning models such as the flipped classroom are often studied through experimental group designs.

However, this visualization shows that most previous research tends to focus on the effectiveness of teaching models in general or limited contexts within medical education, rather than on reading ability and reading motivation in the context of EFL learners. This suggests a research gap that my study could fill, namely testing flipped classrooms to improve reading ability and reading motivation in the context of EFL learners.

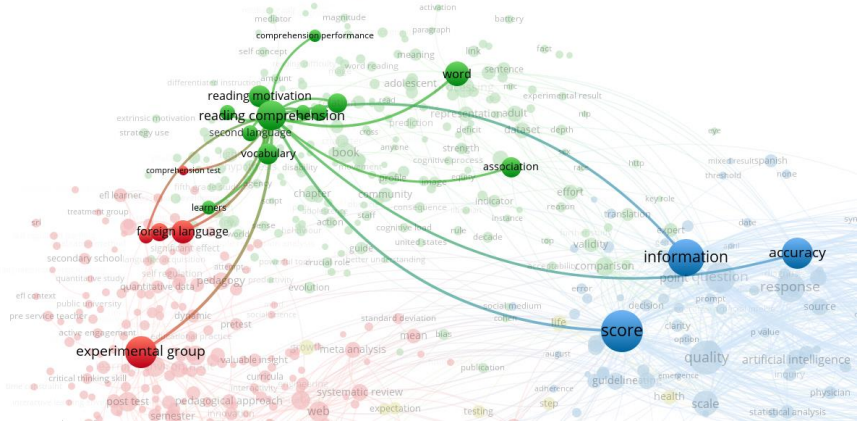

Figure 2. Relationship between "Reading Comprehension", "Motivation", and "Foreign Language"

The second figure shows a network of keyword connections connecting reading motivation, reading comprehension, and foreign language. The green nodes "reading comprehension" and "reading motivation" form the center of the network, indicating that these two concepts have been extensively researched together, primarily in the context of vocabulary, sentence structure, and book learning. Furthermore, the concepts "foreign language" and "experimental group" from the red network demonstrate their relevance to studies on reading comprehension and reading motivation.

However, the relationship between the FC (red network in the bottom left) and reading motivation/reading comprehension (green network) does not appear to be directly connected strongly, indicating that research combining the FC approach to improve reading motivation and comprehension in an EFL context is still limited. This is the basis for the novelty of my research.

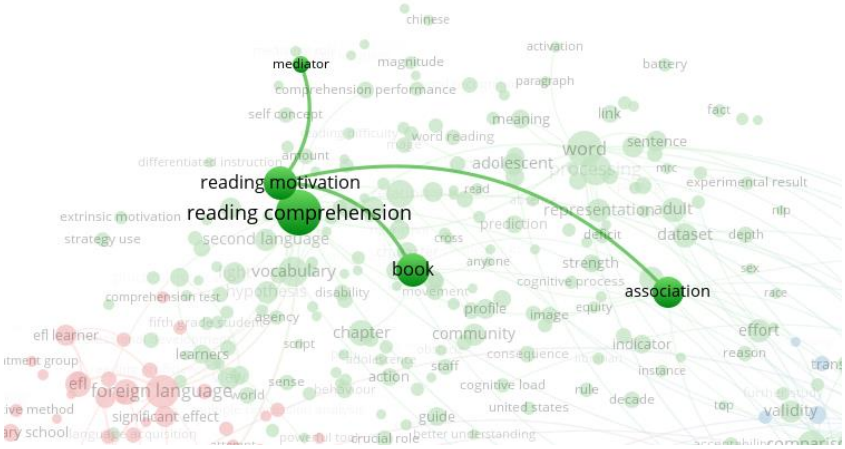

Figure 3. The Interconnection between "Reading Motivation" and "Reading Comprehension"

The third figure clarifies the direct relationship between reading motivation and reading comprehension. Key words such as book, association, and mediator emerge as nodes that play a role in bridging the relationship between motivation and reading comprehension. This confirms that reading motivation plays a mediating role in reading success and is relevant in developing reading learning strategies.

However, no explicit link was found between digital or interactive learning strategies such as the FC and this main node. This suggests that approaches such as the FC have not been widely used strategically to mediate the relationship between motivation and reading comprehension, particularly in the context of foreign language or EFL learners.

Below is a summary of previous studies based on the first five articles from the Scopus data you uploaded. This summary can be used in Background or Literature Review, particularly to support the theoretical framework and demonstrate the novelty of my research. These three visualizations complement each other and show that: FCs have been widely researched, but predominantly in general or medical education contexts, not in the development of EFL learners' reading skills and reading motivation. Reading motivation and reading comprehension have been the focus of many studies, but have not been widely studied in experimental designs with flipped classroom interventions. No study has yet explicitly mapped the role of the FC in bridging reading motivation and reading comprehension, particularly among EFL learners. Thus, my research seeks to fill this significant gap by integrating the elements of the flipped classroom, reading motivation, and reading comprehension into a single experimental framework targeting EFL learners—making it both theoretically innovative and practically relevant.

Based on the background of the research that has been presented, the problems examined and studied in this research are as follows: (1). Is there any effect of using the FC on EFL students' reading comprehension skills? (2). Is there any effect of using the FC on EFL students' reading motivation level? (3). What are the EFL students' perceptions of the implementation of FC implementation in reading instruction?

RESEARCH METHODS

Research Design

This study employs a quasi-experimental method with a non-equivalent control group design to investigate the effect of a FC on the EFL students' reading comprehension and reading motivation. In this design, two groups were used: an experimental group that received the FC and a control group that received traditional instruction without the intervention. Due to practical constraints, random assignment of participants to groups was not possible, and intact classes were utilized instead (Creswell & David Creswell, 2018). This design was represented as follow:

Table 1. The Quasi-Experiment Design

Pre-test	**Training**	**Treatment**					**Post-test**	
M_1 T_1 Q	M_2 X	M_3 X	M_4 X	…	…	M_9 X	M_{10} T_2 Q	M_{11}I
M_1 T_1 Q	M_2C	M_3C	M_4C	-	-	M_9C	M_{10} T_2 Q	-

Note:
M=Meeting
T_1 = Pretest

Q = Questionnaire for reading motivation
C = Conventional Method
X = FC in reading instruction
T_2 = Posttest
I = Interview on Students' Perceptions of Implementing FC

Participants of the Study

The research was conducted in one senior high school, with the research population consisting of ten classes (Class XI 1–Class XI 10), totaling 352 students. Two classes were randomly selected to serve as the experimental and control groups. The random selection process was conducted using a lottery method. Each class name (XI 1, XI 2, ..., XI 10) was written on a small piece of paper, rolled into individual slips, and placed into a single box. The slips were thoroughly mixed, and one was drawn to determine the experimental group. After the first draw, the selected slip was returned to the box, and all the slips were reshuffled. A second draw was then conducted to determine the control group.

Research Instrument

Reading Comprehension Test

One important aspect was content validity, namely the extent to which the test items represent actual reading skills. In this case, the test had been designed to cover various indicators, such as identifying main ideas, understanding vocabulary context, drawing conclusions, and analyzing text structure. To ensure content validity, each item had been validated by an expert in the field of English language education, especially reading skills. This validation process includes an assessment of the material aspect (the suitability of the test content to the curriculum and the student's context), the construction aspect (the coherence and clarity of the question formed at), and the language aspect (the used of simple, clear language, and in accordance with the student's ability level). The validation results showed that the test had met the criteria as a good instrument and was worthy of being used in measuring students' reading comprehension abilities. Thus, this test had a strong foundation as a valid and comprehensive measuring tool (Terrell & Brown, 1981).

The reliability aspect was also a crucial element in ensuring the quality of the reading comprehension test (Terrell & Brown, 1981). Reliability ensured that test results were consistent and stable, even when administered at different times or in different contexts (Terrell & Brown, 1981). One common method to measure reliability was using Cronbach's Alpha, which evaluated the internal consistency of test items. Cronbach's Alpha assessed how well the items in a test measured the same construct, such as reading comprehension skills. A high Cronbach's Alpha value (generally above 0.70) indicates that the test items were reliable measurements (Dewati & Widyasari, 2017). For example, in a reading comprehension test, items targeting skills like understanding the main idea, inferring meaning, and analyzing text structure should consistently reflect students' skill. By calculating Cronbach's Alpha, researchers can ensure the test provided accurate and dependable results.

For the analysis of item quality in English reading tests, two main aspects used were item difficulty and item discrimination (Terrell & Brown, 1981). Item difficulty measured the extent to which an item can be answered correctly by test takers, which was usually expressed in the formed of a proportion index. Tis index ranges from 0.00 to 1.00, where lower values indicate difficult items, while higher values indicate easy items. Items with an ideal item difficulty were generally in the range of 0.30 to 0.70.

Meanwhile, item discrimination indicates the ability of an item to differentiate between participants with high and low abilities. The item discrimination value ranges from -1.00 to 1.00, where positive values approaching 1.00 indicate that the item had good discriminatory power, while negative values indicate that the item was ineffective or misleading (Latief, 2001). Point biserial correlation formula was a formula to find out the item discrimination of each test item (Suwarto, 2021; Suwarto et al., 2023). The item discrimination was divided into four, which were bad, acceptable, good and very good. The bad item was removed. However, the acceptable item should be changed for good and very good items. They will be stored in the test bank (Suwarto et al., 2023).

The pretest and post-test were piloted on 200 students. This number was purposefully chosen to meet the minimum data requirements for conducting item analysis using the QUEST program, which is based on the Rasch model. The QUEST program requires an adequate number of respondents to ensure stable and accurate estimations of item parameters, such as item difficulty, item discrimination, and test reliability. According to (Linacre, 1994), a minimum of 100 respondents is sufficient for exploratory purposes, while a sample size of at least 200–250 is recommended for more robust and high-stakes measurement contexts. Several empirical studies have used similar or slightly larger sample sizes when applying QUEST. For example, (Futri et al., 2022) analyzed mathematics test items using QUEST with 398 students and reported stable item parameters and model fit. (Ernawati, 2024) successfully applied QUEST to analyze test items answered by 187 elementary school students, confirming its applicability for moderate-sized samples. Therefore, piloting the instruments on 200 students in this

study follows psychometric recommendations and aligns with established practices in previous QUEST-based research.

The reliability of the reading comprehension test (pretest) was 0.960. It could be seen in internal consistency of the last page of the output of QUEST program. The reliability of the reading comprehension test (post-test) was 0.910. It could be seen in internal consistency of the last page of the output of QUEST program. It meant that the test was reliable. As stated (Dewati & Widyasari, 2017) that a test was said reliable if the reliability test index was exceeded 0.700.

Reading Motivation Questionnaire

Reading motivation was one of the key factors that influence students' engagement in literacy activities. Students with high reading motivation tend to show greater interest in texts and were more likely to read deeply and regularly. To obtain accurate data on the reading motivation levels of senior high school students, a questionnaire adapted from the original Motivation for Reading Questionnaire (MRQ) developed by (WANG & GUTHRIE, 2004) (Baker & Wigfield, 1999; Wigfield et al., 2016) was used. This instrument was selected because it was considered capable of representing various dimensions of reading motivation comprehensively. This adaptation was designed to ensure relevance and ease of used for high school students, with a focus on key aspects of intrinsic and extrinsic motivation.

The original MRQ consisting of 53 questions was reduced to 19 items to improve clarity, reduce respondent fatigue, and maintain important aspects of reading motivation. The revised questionnaire consisted of 19 carefully selected items, with a 4-point Likert scale (1 = "very unlike me," 2 = "a little unlike me," 3 = "a little like me," and 4 = "very like me"). This adaptation aimed to maintain the validity and reliability of the original MRQ, while making it more appropriate to the cognitive and motivational levels of high school students. To measure the results of this questionnaire, the responses were categorized into three levels of reading motivation: low, medium, and high. The score for each student was determined by summing the responses across all 19 items, with each item scored from 1 to 4. After calculating the total score, it was categorized as follows: low motivation for reading (total score ranging from 19 to 37), medium motivation for reading (38 to 57), and high motivation for reading (58 to 76). These categories were used to assess students' overall level of reading motivation based on their responses.

Interview of Students' Perception

A semi-structured interview was conducted to explore students' perceptions of the FC implementation, focusing on its benefits and challenges in enhancing reading comprehension and motivation. This approach allowed for an in-depth investigation of students' experiences, providing flexibility to delve deeper into specific responses. The interview aimed to gather insights into how this innovative teaching strategy influenced their ability to analyze texts, collaborate with peers, and engage in self-directed learning. Additionally, it examined the factors influencing reading motivation as a result of the method's integration, identifying any obstacles students faced and the strategies they used to overcome them. The findings were expected to shed light on the practical implications of the FC in fostering a more engaging and effective reading environment.

Data Collection

To respond to the research objectives of this study, reading comprehension tests, questionnaire and semi-structured interview were used to collect data. The reading comprehension tests (pre-test and post-test) aimed to investigate the students' improvement in their reading comprehension skills, and semi-structured interview was for exploring the students' perception on FC implementation, benefits and challenges. At the beginning of the research, each participant from both the experimental and control groups was individually pre-tested. on their reading comprehension achievement by multiple choice test. The pretest was the same for all of the groups. The pretest and post-test were different test but having the same indicators. The questionnaire for reading motivation will also gave in first meeting. Then, the experimental group implemented FC and the control group received conventional method for 11 meetings of each treatment including the pretest, post-test, questionnaire for reading motivation.

Technique of Data Analysis

N-Gain

The N-gain (Normalized Gain) was used to measure the relative improvement of students' performance from pre-test to post-test. The formula was:

$$\text{N} - \text{gain} = \frac{\text{Posttest score} - \text{Pretest score}}{\text{Maximum score} - \text{Pretest score}}$$

Note:

Post-test score is the score obtained by the student after the intervention.

Pre-test score is the score obtained by the student before the intervention.
Maximum score is the highest possible score on the test.

The N-gain value can be interpreted as follows:

Table 2. Category N-Gain Score

N-Gain (g)	Category
g > 0.7	High
0.3 ≤ g ≤ 0.7	Medium
g < 0.3	Low

(Hake, 1998; Meltzer, 2002)

Table 3. Categories for Interpreting the Effectiveness of N-Gain Scores

Percentage (%)	Interpretation
< 40	Not Effective
40 - 55	Less Effective
56 – 75	Quite Effective
>76	Effective

(Hake, 1998; Meltzer, 2002)

Independent-Sample Test

Independent-Sample Test analysis was used to determine whether there were differences in reading comprehension achievement and reading motivation between the experimental group and the control group. The formula that can be used to calculate Independent-Sample Test as follows:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{s^2}(1/n_1 + 1/n_2)}$$ (Suwarto, 2018)

The N-Gain test and independent-sample test were conducted using SPSS.

RESULTS AND DISCUSSION

Validity

The purpose of the validity assessment in this study was to evaluate the extent to which the instrument met all the required aspects to measure the desired construct. The research instruments consisted of: (1) reading comprehension test for pre-learning assessment (Pre-test), (2) reading comprehension test for post-learning assessment (Post-test), (3) reading motivation questionnaire, and (4) an interview form. All research instruments underwent qualitative analysis to determine their content validity. The qualitative analysis was conducted by an English language education lecturer with 30 years of teaching experience. The results of the qualitative analysis can be summarized as follows.

Table 4. Content Validity

Instrumen	Content Validity
Pre-test	Valid
Pos-test	Valid
Motivasi Membaca	Valid
Lembar Wawancara	Valid

Reliability

Reliability assessment measures the internal consistency of a research instrument, specifically the extent to which it consistently produces stable results when administered multiple times to the same subjects. Essentially, reliability reflects the stability and reliability of an instrument in quantifying a specific construct. In this study, reliability testing was conducted using the Cronbach's Alpha formula. The following explanation outlines the interpretation of the reliability coefficient value: A value of 0.700 or higher is considered reliable, while a value below 0.700 is considered unreliable. Based on the calculation results, all instruments measured in this study demonstrated Cronbach's Alpha values exceeding 0.700, thus leading to the conclusion that the instruments used are reliable and suitable for further analysis.

Tabel 5. Reliability

Instrumen	Cronbach Alpha	Description
Pre-test	0.960	Reliable
Pos-test	0.910	
Motivasi Membaca	0.896	

Normality

In this study, normality tests were conducted using the Kolmogorov-Smirnov method through IBM SPSS Statistics. The probability value (Asymp. Sig.) was used as the basis for decision criteria in this test, with the following guidelines: If the probability value exceeds 0.05, the dataset is considered to follow a normal distribution. Conversely, if the value is below 0.05, the dataset is regarded as not normally distributed.

Table 6. Summary of Normality Tests for Reading Comprehension, Reading Motivation

Aspect	Group	N	Asymp	Pre-test	N	Asymp	Post-test
Reading Comprehension	Experimental Group	35	0.901	Normal	35	0.875	Normal
	Control Group	35	0.833	Normal	35	0.931	Normal
Reading Motivation	Experimental Group	35	0.875	Normal	35	0.124	Normal
	Control Group	35	0.931	Normal	35	0.573	Normal

Asymp: Asymp. Sig. (2-tailed)

Based on the results of the normality tests presented in Table 6, all research variables—including Reading Comprehension, and Reading Motivation—in both the experimental group and the control group, showed a normal distribution for both the pre-test and post-test phases. This is indicated by the "Normal" result for each combination of variable and group, meaning that the data meet the assumption of normality. This condition is essential in quantitative research, as it is one of the prerequisites for applying parametric statistical analyses, such as the t-test. Therefore, it can be concluded that all the data used in this study are appropriate for analysis using parametric statistical techniques, as they meet the required normality assumption.

Homogeneity

The Levene Statistic test for homogeneity checks if the two sample classes have similar variances. According to the criteria, if the significance value for the mean exceeds 0.05, the data is considered to be homogeneously distributed. The homogeneity test results are shown in Table 7.

Table 7. Homogeneity Test of Reading Comprehension and Reading Motivation

Aspect	Group	F	Sig.	Pre-test	F	Sig.	Post-test
Reading Comprehension	Experimental Group	0.212	0.647	Homogen	0.116	0.735	Homogen
	Control Group						
Reading Motivation	Experimental Group	0.021	0.886	Homogen	3.878	0.053	Homogen
	Control Group						

The test results showed that all data from the experimental and control groups, both for reading comprehension and reading motivation, were homogen. This means that the variance between groups was uniform and met the assumption of homogeneity, making the data suitable for further parametric statistical analysis, such as the independent sample t-test and the N-Gain test.

The Reading Comprehension and Reading Motivation Pre-Test in the Experimental and Control Groups

In order to answer the research questions 1, the pre-test scores of the learners from the experimental and control groups were initially compared. The descriptive statistics of the writing pre-test from Table 4.1 depicted that the mean score of the experimental group was 16.17 with the standard deviation 2.738. Meanwhile, the mean score and the standard deviation of the control group was 15.46 and 2.582, respectively.

Tabel 8. Descriptive Statistics of the Pre-test Scores of the Learners from the Experimental and Control Groups

Score	Group	N	Mean	Std. Deviation
Pre-test	Experimental	35	16.17	2.738
	Control	35	15.46	2.582

The result of the comparison of the pre-test scores using independent sample t-test implied that there was no significant difference in the pre-test scores between the experimental group (p-value = 0.265) before the treatment, meaning that the reading comprehension skill of both groups were equal (see Table 9).

Table 9. Comparison of the Pre-test Scores Using Independent Sample T-test

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
									95% Confidence Interval of the Difference	
		F	Sig	T	df	Sig. 2-tailed	Mean Difference	Std. Error Difference	Lower	Upper
PRE	Equal variances assumed	.212	.647	1.123	68	.265	.714	.636	-.555	1.984
	Equal variances not assumed			1.123	67.766	.266	.714	.636	-.555	1.984

Comparison of the Post-test Scores of the Learners from the Experimental and Control Groups

The descriptive statistics of post-test scores of the experimental and control groups showed that the mean score of the experimental group was 25.77 with the standard deviation 2.197. Meanwhile, the mean score and the standard deviation of the control group was 19.80 and 2.518, respectively (see Table 10). Comparing the descriptive statistics on the mean scores of the post-test, it asserted that there was an improvement on the learners reading comprehension skill after the treatment.

Tabel 10. Descriptive Statistics of the Post-test Scores of the Learners from the Experimental and Control Groups

Score	**Group**	**N**	**Mean**	**Std. Deviation**
Post-test	Experimental	35	25.77	2.197
	Control	35	19.80	2.518

The independent-sample t-test was then applied to examine the effect of FC on the learners' reading comprehension skill and the result was displayed in Table 11.

Table 11. Comparison of the Post-test Scores Using Independent Sample T-test

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
									95% Confidence Interval of the Difference	
		F	**Sig**	**t**	**df**	**Sig. 2-tailed**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
POST	Equal variances assumed	.116	.735	10.570	68	.000	5.971	.565	4.844	7.099
	Equal variances not assumed			10.570	66.775	.000	5.971	.565	4.844	7.099

The statistical data in Table 11 (p-value = 0.000) indicated that there was a significant difference on the post-test scores between the experimental and control groups of learners. The mean of the learners from the experimental group (25.77) was higher than the mean of the learners from the control group (19.80). Based on the result of the comparison of post-test scores, it can be inferred that the learners taught by using the FC method achieved better reading comprehension skill than those taught by using the conventional method.

In order to answer the research questions 2, the pre-motivation scores of the learners from the experimental and control groups were initially compared. The descriptive statistics of the writing pre-motivation from Table 12 depicted that the mean score of the experimental group was 38.06 with the standard deviation 6.352. Meanwhile, the mean score and the standard deviation of the control group was 37.29 and 6.138, respectively.

Tabel 12. Descriptive Statistics of the Pre-motivation Scores of the Learners from the Experimental and Control Groups

Score	**Group**	**N**	**Mean**	**Std. Deviation**
Pre-motivation	Experimental	35	38.06	6.352
	Control	35	37.29	6.138

The result of the comparison of the pre-motivation scores using independent sample t-test implied that there was no significant difference in the pre-motivation scores between the experimental group (p-value = 0.607) before the treatment, meaning that the reading motivation skill of both groups were equal (see Table 13).

Table 13. Comparison of the Pre-motivation Scores Using Independent Sample T-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig	t	df	Sig. 2-tailed	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
PRE	Equal variances assumed	.021	.886	.517	68	.607	.771	1.493	-2.208	3.751
	Equal variances not assumed			.517	67.921	.607	.771	1.493	-2.208	3.751

Comparison of the Post-motivation Scores of the Learners from the Experimental and Control Groups

The descriptive statistics of post-motivation scores of the experimental and control groups showed that the mean score of the experimental group was 68.17 with the standard deviation 7.801. Meanwhile, the mean score and the standard deviation of the control group was 53.60 and 9.201, respectively (see Table 14). Comparing the descriptive statistics on the mean scores of the post-motivation, it asserted that there was an improvement on the learners reading motivation skill after the treatment.

Tabel 14. Descriptive Statistics of the Post-motivation Scores of the Learners from the Experimental and Control Groups

Score	Group	N	Mean	Std. Deviation
Post-motivation	Experimental	35	68.17	7.801
	Control	35	53.60	9.201

The independent-sample t-test was then applied to examine the effect of FC on the learners' reading motivation skill and the result was displayed in Table 15.

Table 15. Comparison of the Post-motivation Scores Using Independent Sample T-test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig	t	df	Sig. 2-tailed	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
POST	Equal variances assumed	3.878	.053	7.146	68	.000	14.571	2.039	10.503	18.640
	Equal variances not assumed			7.146	66.227	.000	14.571	2.039	10.501	18.642

The statistical data in Table 4.8 (p-value = 0.000) indicated that there was a significant difference on the post-motivation scores between the experimental and control groups of learners. The mean of the learners from the experimental group (68.17) was higher than the mean of the learners from the control group (53.60). Based on the result of the comparison of post-motivation scores, it can be inferred that the learners taught by using the FC method achieved better reading motivation skill than those taught by using the conventional method.

N-Gain Scores of Reading Comprehension and Reading Motivation

Based on the results of the N-Gain analysis with SPSS related to the Reading Comprehension Test and Reading Motivation Test, the following summary can be made.

Table 16. N-Gain Scores and Percentages of Reading Comprehension and Reading Motivation

Aspect	Group	Ngain	Mean	Description
Reading Comprehension	Experiment Group	NGain_Score	0.7730	High
		NGain_Percentage	77.3026	Effective
	Control Group	NGain_Score	0.3254	Medium
		NGain_Percentage	32.5406	Less Effective
Reading Motivation	Experiment Group	NGain_Score	0.8171	High
		NGain_Percentage	81.7120	Effective
	Control Group	NGain_Score	0.4387	Medium
		NGain_Percentage	43.8733	Less Effective

Table 16 shows that the increase in reading comprehension in the experimental group was significantly higher than in the control group. The high N-Gain score (0.7730) and percentage of 77.30% indicate that the treatment given to the experimental group was very effective in improving reading comprehension. Meanwhile, the control group only showed moderate improvement with low effectiveness.

The increase in reading motivation was also significantly better in the experimental group. The N-Gain score of 0.8171, with a percentage of 81.71%, is categorized as very high and effective. In contrast, the control group only achieved moderate improvement and low effectiveness. The high N-Gain score in the experimental group indicates that the FC model intervention was very effective in improving reading comprehension. This is in line with the research of (Rachmat et al., 2021), which concluded that FC significantly spurred reading ability improvement compared to conventional methods, supported by a quasi-experimental design and pre-post-test.(Bin Noordan & Md. Yunus, 2022) also found that FC create a "synergy of pedagogy and technology" that effectively improves students' reading comprehension. The sharp increase in reading motivation (N-Gain 0.8171) strengthens the finding that FC improve students' motivation and learning attitudes. A meta-analysis study reported a 24% increase in student learning motivation in the FC model compared to the conventional method.

INTERVIEW RESULTS

In order to answer the research questions 3, interviews with three students showed that the implementation of the FC in English reading learning had a variety of impacts, both in terms of benefits and challenges faced by students. Overall, all three students agreed that this approach has positive potential for improving reading comprehension. D, F, and N acknowledged increased focus during face-to-face class sessions because they had previously studied the material at home. Furthermore, the ability to re-access learning videos was an important aspect that helped them understand the material better. N specifically stated that this approach made her more enthusiastic about reading and expanded her vocabulary. F added that independent learning at home increased her self-confidence and encouraged her to be more active in asking questions in class.

The interview findings of this study align with research conducted by (Septiani et al., 2022), which showed that the implementation of FC significantly improved students' reading skills compared to conventional methods. Interview findings from three students reported increased focus, active engagement, and progress in comprehension after face-to-face sessions. (Bin Noordan & Md. Yunus, 2022) concluded that FC create a synergy between pedagogy and technology that effectively improves reading comprehension. This aligns with D, F, and N's recognition of benefits such as video replay, ease of learning new vocabulary, and increased enthusiasm for reading.

Several challenges, such as internet stability and video quality, were highlighted, in line with (Septiani et al., 2022) findings that smartphone-based technology and content can be a barrier if not managed properly. This view aligns with F's complaints about the internet connection, and D and N's complaints about the difficulty of managing independent learning. Although FC encourage independent learning, interviews emphasized the need for teachers for clarification and motivation. This aligns with research showing that the success of the FC is heavily influenced by technical and pedagogical support and teacher adaptation of strategies.

CONCLUSION

This study was conducted to investigate the effect of the FC approach on EFL students' reading comprehension skills and their reading motivation levels, as well as to explore students' perceptions of FC implementation in reading instruction. The research employed a quasi-experimental design involving senior high school students in two groups: the experimental group taught using the FC model and the control group taught using conventional methods. The findings of the study led to the following conclusions: (1). The Flipped Classroom had a significant positive effect on EFL students' reading comprehension skills. Students in the

experimental group demonstrated greater improvement in reading achievement compared to those in the control group, as shown by their post-test scores. This confirms that pre-class exposure to texts and in-class collaborative learning activities facilitated deeper understanding, critical thinking, and retention of reading content. (2). The FC also had a significant effect on students' reading motivation levels. Students exposed to the FC model exhibited increased intrinsic and extrinsic motivation, with higher levels of curiosity, engagement, and autonomy in reading tasks. The interactive and student-centered learning environment promoted by the FC model was key to enhancing students' enthusiasm and confidence in reading English texts. (3). Students' perceptions of the FC implementation in reading instruction were generally positive. Interviews revealed that students appreciated the flexibility of pre-class learning, the interactive nature of in-class activities, and the sense of independence they developed through the process. In summary, the FC model, when carefully designed and implemented, can serve as an effective instructional approach to support EFL students' reading comprehension and motivation. This research supports the integration of technology-enhanced and collaborative learning strategies in EFL classrooms.

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