The Effectiveness of Collaborative Mobile-Assisted English Learning (C-MAEL) for Enhancing Academic English Reading Comprehension of University Students at Guangxi University of Science and Technology

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Abstract

The present study had 3 primary objectives: 1) examine the factors affecting academic English reading comprehension of university students in Guangxi Province, 2) confirm the appropriateness of Collaborative Mobile-Assisted English Learning (C-MAEL) model to enhance English learning achievements of university students at Guangxi University of Science and Technology, and 3) study the effectiveness of Collaborative Mobile-Assisted English Learning (C-MAEL) for enhancing academic English reading comprehension of university students at Guangxi University of Science and Technology. The research methodology was structured into three distinct phases: Phase I: studying the internal and external factors affecting students' academic English reading comprehension gathering data through questionnaires administered to 275 undergraduate students and interviews conducted with

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7 lecturers from 3 universities in Guangxi Province; Phase II: developing Collaborative Mobile-Assisted English Learning (C-MAEL) instructional model for enhancing academic English reading comprehension based on instructional model development theory and the findings from Phase I, plus rigorous evaluation against four standards: utility, feasibility, propriety, and accuracy by 5 experts using an instructional model evaluation form; and Phase III: investigating the effectiveness of the developed instructional model – putting it into practice through lesson plans for experimentation. Data collection encompassed pretest and posttest from 39 Guangxi University of Science and Technology in semester 2 academic year 2023. Statistical analysis techniques such as frequency, percentage calculations, means, standard deviations, interpretation, and content analysis were employed to analyze the collected data.

The findings of this study can be summarized as follows:

1) The internal factors affecting for undergraduate students' academic English reading comprehension were learning engagement, motivation, needs, satisfaction, attitude, and autonomous learning while external factors were teaching model, teaching activities, learning environment, learning tasks, relationship between teacher and students, and materials and resource.

2) C-MAEL learning instructional model to enhance undergraduate students' academic English reading comprehension consisted of 5 components i.e., principle and rationale, learning objectives, contents, methods of teaching and materials, and

evaluation. After programme evaluation (utility, feasibility, propriety, and accuracy), such a model was 100% confirmed by 5 experts for further Implementation.

3) Based on the testing results, the mean posttest scores (M = 86.96, SD = 7.48) were significantly higher than the mean pretest scores (M = 66.54, SD = 10.31). The paired-sample t-test conducted on the single sample group yielded a t-value of -15.91 and a p-value of .00, indicating that the differences between the pretest and posttest scores were statistically significant at the 0.05 level (*p < .05).

Keywords: Collaborative Mobile-Assisted English Learning, Academic English Reading Comprehension, Guangxi University of Science and Technology

Introduction

English as a global lingua franca has become pervasive due to globalization, with about one-third of the world's population using it, and over 70% using it as a second language (Crystal, 2012). In China, English plays a crucial role in international, scientific, technological, and cultural exchanges (Kang et al., 2020). This has sparked widespread interest in English education across all levels of Chinese schooling, from primary to university (Li et al., 2019). Over the past 70 years, English education in Chinese universities has evolved significantly, continually refining its curriculum, teaching methods, and evaluation systems (Xiao & Li, 2022). However, the advent of the Fourth Industrial Revolution has introduced new challenges and opportunities, pushing English education into a new phase (Li et al., 2019).

In Guangxi province, universities face obstacles in enhancing undergraduate English reading comprehension amid the digital and intelligent society. Challenges include managing knowledge explosion, unclear teaching orientations (Chen, 2020; Lan, 2020; Peng, 2019), large class sizes (Pan et al., 2020; Chen & Qin, 2019; Wang, 2016), reduced academic credits, traditional teaching methods, assessment shortcomings, and limited resources (Wen, 2014).

From an instructional perspective, outdated teaching approaches and technological challenges hinder effective teaching (Li, 2014). Students also face barriers like low proficiency, lack of motivation, and inadequate autonomous learning skills. These issues

create a negative learning environment, impeding English learning achievements (Huang, 2012; Sun & Wang, 2016; Wang, 2016; Li, 2019; Deng, 2018).

In response, there is a growing focus on integrating modern information technology into English education (College English Teaching Guide, 2020). Mobile-Assisted Language Learning (MALL) has emerged as a significant approach, leveraging mobile technologies to enhance language learning. Initially termed Mobile Learning (M-learning), MALL now encompasses broader technological applications like smartphones and tablets, facilitating flexible, interactive, and collaborative learning environments (Kukulska-Hulme & Shield, 2008).

However, current MALL research primarily emphasizes content delivery, falling short of fully integrating modern technologies as advocated by recent educational guidelines (College English Teaching Guide, 2020). The evolving landscape of mobile communication and computing technologies demands diversified MALL applications, including augmented reality, virtual reality, and collaborative learning approaches (Chen & Jia, 2020; Weng, 2020). This study proposes exploring an integrated instructional model, Collaborative Mobile-Assisted English Learning (C-MAEL), to address these challenges and enhance English learning achievements among Guangxi undergraduates in the digital era.

Research Objectives

1. To study the factors affecting English reading comprehension of university students in Guangxi Province.

2. To develop the Collaborative Mobile-Assisted English Learning (C-MAEL) instructional model for enhancing English reading comprehension of university students at Guangxi University of Science and Technology.

3. To study the effectiveness of Collaborative Mobile-Assisted English Learning (C-MAEL) instructional model for enhancing English reading comprehension of university students at Guangxi University of Science and Technology.

Research Methods

The present study was divided into 3 phases with population and samples or key informants, research instruments, data collection and data analysis as follows.

Phase I – Exploring and analyzing the factors affecting students' academic English reading comprehension at Guangxi University of Science and Technology

Key Informants

The informants in this phase were divided into two groups. Group I consisted of 80 students from Guilin University of Electronic Technology (GUET), 118 students from Guilin University of Technology (GUT), and 77 students from Guangxi University of Science and Technology (GXUST), all majoring in Computer Science and Technol-

ogy and enrolled in a College English Course in the second semester of the 2023 academic year. The sample size was deemed adequate and sufficient for this study, calculated according to Krejcie and Morgan's formula (Krejcie & Morgan, 1970, p. 608) for determining sample size of a known population. This formula set the population proportion at 0.5, with a 95% confidence level and a 5% margin of error, ensuring statistically significant results with minimal errors. The other group consisted of 7 lecturers from three universities in Guangxi Province: 2 from Guilin University of Electronic Technology (GUET), 3 from Guilin University of Technology (GUT), and 2 from Guangxi University of Science and Technology (GXUST). These lecturers taught the College English Course in the second semester of the 2023 academic year.

Research Instruments

Five-point Likert scale questionnaire was employed to collect data from Group I informants. Its content validity was approved by the calculated Item-Objective Congruence (IOC) values of 0.85. The questionnaire covered the items regarding internal factors and external factors i.e., learning engagement, motivation, needs, satisfaction, attitude, autonomous learning, teaching model, teaching activities, learning environment, learning tasks, relationship between teacher and students, and materials and resource. An in-depth interview with IOC value of 0.94 was designed to collect data from lecturers in Group 2. It consisted of 10 questions corresponding to the internal and external factors related to problems in teaching English reading,

opinions on method of instruction, development of reading and learners' learning behaviors about English reading skills.

Data Collection

In order to collect data from Group I effectively, the informants were allowed to answer the questionnaires independently. Then they were collected back by the researcher. Each informant was labeled, marked with numbers and sorted by the researcher. As for Group II, the researcher administered the semi-structured interviews. The answer record of each lecturer was labeled, coded with numbers and sorted by the researcher.

Data Analysis

Data obtained from Group I informants were quantitatively analyzed by descriptive statistics i.e., frequency, MEAN, and standard deviation along with interpretation of MEAN on basis of 4 ranges of attitude, 1.00 – 4.00, from the lowest to the highest agreement. The factors obtained from the students are interpreted by using MEAN interpretation criteria proposed by Pornel, Balinas & Saldana (2011, p. 103). The 4 levels of frequency were calculated by using the formula as detailed in Table 1.

Table 1 Mean range of five levels of frequency of questionnaire for students

Mean range	Interpretation
3.50-4.00	The Highest Agreement
2.50-3.49	High Agreement
1.50-2.49	Low Agreement
1.00-1.49	The Lowest Agreement

Besides, content analysis was used to analyze data collected from lecturers.

Phase II – Developing C-MAEL instructional model to enhance undergraduate students' academic English reading comprehension at Guangxi University of Science and Technology

Key Informants

Three specialists in curriculum and instruction, particularly program evaluation were invited to evaluate the developed instructional model.

Research Instrument

A handout with details of C-MAEL instructional model was provided to the specialists as to introduce the components and functions of such a model based on instructional model development theories and factor outcomes obtained from phase I. Then, instructional model evaluation form was used by the specialists to approve to quality of the model before

further implementation within 4 standards i.e., utility, feasibility, propriety, and accuracy. IOC value of both instruments measure 1.00.

Data Collection

After collecting data in phase I and designing handout and instructional model evaluation form, the handout and instructional model evaluation form were submitted to all 5 specialists and were collected by the end of the same month. The data of each specialist was labeled, coded with numbers, and sorted by the researcher.

Data Analysis

Frequency and percentage were employed to analyze dichotomy between 'Agree' and 'Disagree' among 5 specialists with 5 components of the model, namely principle/concepts, objectives, contents, methods of teaching and materials, and evaluation. The accepted component must be agreed by specialists not less than 90%.

Phase III – Studying the results of implementing C-MAEL instructional model to enhance undergraduate students' academic English reading comprehension at Guangxi University of Science and Technology

The implementation of the C-MAEL instructional model in this study aimed to enhance undergraduate students' academic English reading comprehension across four hierarchical levels of cognition (Smith, 1988): **Literal Comprehension** (Directly

identifying text elements such as vocabulary, facts, ideas, events, and stated information, involving specific answers to questions), Interpretation (Explaining and reconstructing text, demonstrating students' indirect understanding), **Critical Reading** (Analyzing and applying processes, models, questions, and theories to enhance text clarity and comprehension) and **Creative Thinking** (Developing unique, original solutions to problems through innovative thinking).

Population

The population included 77 students majoring in Computer Science and Technology who enrolled in College English Course at Guangxi University of Science and Technology in semester 2 academic year 2023 from 2 classes of students with different levels of learning achievement – beginner, intermediate, and advanced.

Samples

Since the present study was based on one-group pretest-posttest research design, 39 undergraduate students who enroll in College English Course students from Class B of all two class at Guangxi University of Science and Technology in semester 2 academic year 2023 were obtained.

Research Instrument

To implement the developed instructional model, lesson plans using Collaborative Mobile-Assisted English Learning (C-MAEL) instructional model were designed in line with the teaching material employed in the College English Course – New Era Academic

English Integrated Course. This book belongs to the series of English for Academic Purpose (EAP), which helped students lay the strong language foundation for their professional English. All of the 8 units in the book are taught in College English Course. The researcher chose two units out of eight to implement the experiment: UNIT 4 Gender Equality and UNIT 5 Artificial Intelligence with total 16 hours. As for collecting students' academic English reading comprehension skill data, the researcher designed multiple choice pretest and posttest.

Data Collection

1. Pretest was administered to the samples before the experiment relying on prepared lesson plans.

2. Posttest was used to collected students' achievement after the experiment.

Data Analysis

Scores from the pretest and posttest were analyzed using descriptive statistics, including frequency, mean, and standard deviation. A paired t-test for dependent samples was employed to test the research hypothesis, which posited that students would demonstrate higher academic English reading comprehension after learning through the C-MAEL instructional model.

Results

1) The Factors Affecting Undergraduate Students' Academic English Reading Comprehension at Guangxi University of Science and Technology

1.1 Students' Attitude Survey Results

This section presented the analysis results serving objective 1 using table and description in terms of MEAN, standard deviation, and interpretation (Level of Attitude) as shown in Table 2.

Table 2 The result of questionnaire from students in overview

Factors	$\overline{X}$	S.D.	Interpretation
Internal factors (respondents)			
1. Students are very interested in enhancing English learning achievements.	3.27	0.76	High
2. Students actively learn College English course.	2.68	0.79	High
3. Students feel that this subject can improve their knowledge of the contents increasingly.	2.87	0.72	High
4. Students feel happy to register for this subject.	2.77	0.80	High

Table 2 The result of questionnaire from students in overview (Continued)

Factors	$\overline{X}$	S.D.	Interpretation
5. Students are industrious in their learning (Assignments, Projects, Participation, etc.) with the highest potential themselves.	2.78	0.78	High
6. Students feel interested in the teacher's teaching style.	3.17	0.71	High
7. Students always attend class on time except for accidental cases.	3.74	0.46	The highest
8. Students explore more knowledge by themselves after the classroom.	2.79	0.81	High
9. The teacher can help students in terms of knowledge and others according to student requests.	3.11	0.70	High
10. Students found that there is valuable time to study this subject.	2.70	0.82	High
11. Students feel bored to study this subject but they need to study because it is pre-requisite subject.	2.52	0.92	High
12. Students aware of studying this subject is useless.	3.01	0.87	High

Table 2 The result of questionnaire from students in overview (Continued)

Factors	$\overline{X}$	S.D.	Interpretation
13. Students won't recommend friends to study this subject if it is not pre-requisite subject.	2.73	0.93	High
14. Students are improved knowledge and social skills by this subject.	2.80	0.74	High
15. Students feel unsure that this subject can apply in their daily life.	2.51	0.83	High
Total Average of Internal Factors	**2.90**	**.78**	**High**
External factors (teachers, circumstances)			
16. Students can understand content clearly through this teaching model.	3.06	0.69	High
17. Teacher always use traditional teaching activities which are boring and uninteresting.	2.88	0.79	High
18. Content is unrelated to current situation.	2.74	0.83	High
19. Resources and teaching material are uninteresting and unable to achieve the goal.	2.70	0.81	High

Table 2 The result of questionnaire from students in overview (Continued)

Factors	$\overline{X}$	S.D.	Interpretation
20. Fixed learning places affect learning interest.	2.33	0.78	Low
21. Learning tasks are challenged and encouraged the students' enthusiasm.	2.69	0.79	High
22. Classroom environment affects students' learning enthusiasm.	2.88	0.74	High
23. Contents are limited, defective and unrealistic.	2.54	0.80	High
24. Evaluation method is traditional and unmeasurable.	2.46	0.74	Low
25. Students notice that some students are constant absent in this classroom.	2.83	0.87	High
26. Viral communication about getting high grade easily from the senior students persuades many students to enroll in this subject.	2.22	0.79	Low
27. Viral communication about uncomplicated lesson and unstrict teacher persuades many students to enroll in this subject.	2.38	0.87	Low

Table 2 The result of questionnaire from students in overview (Continued)

Factors	$\overline{X}$	S.D.	Interpretation
Total Average of External Factors	2.63	.80	High
Total Average of All Factors	2.77	.79	High

Table 2 reported the results of the factors affecting English learning achievements of university students in Guangxi Province. They were generally found at the high level ($\overline{X}$ = 2.77). All internal factors affecting academic English reading comprehension of university students in Guangxi Province were generally found at high level ($\overline{X}$ = 2.90). Considering only each item, it was found that No.7 was the highest mean ($\overline{X}$ = 3.74), followed by No.1 ($\overline{X}$ = 3.27) and No.6 ($\overline{X}$ = 3.17). The fewest mean was No.15 ($\overline{X}$ = 2.51). For external factors affecting academic English reading comprehension of university students in Guangxi Province were generally found at high level ($\overline{X}$ = 2.63). Considering only each factor, it was found that No.16 was the highest mean ($\overline{X}$ = 3.06), followed by No.17 ($\overline{X}$ = 2.88) and No.22 ($\overline{X}$ = 2.88). The fewest mean was No.27 ($\overline{X}$ = 2.22).

1.2 Teachers' Interview Results

Following interviews with seven lecturers, the factors influencing academic English reading comprehension among undergraduate students in Guangxi province can be summarized as follows:

Internal Factors

Physical Factors: Lecturers emphasized that students' academic English reading comprehension is heavily influenced by their engagement in course content, class activities, and teacher interactions. Efforts are made to maintain student interest and achieve learning goals through active participation.

Psychological Factors: Lecturers agreed that learning motivations and strategies significantly impact students' reading comprehension. Motivations include the desire to continue learning English, interest in course content, clear learning objectives, and self-efficacy in studying College English. Effective learning strategies focus on collaboration, interaction with peers and teachers, and the use of technology.

Emotional Factors: Lecturers noted that a careless attitude negatively affects comprehension by reducing interest and motivation. However, competitive learning tasks like group work and presentations can enhance confidence and comprehension. Additionally, learning satisfaction, which brings a sense of success and happiness, encourages greater enthusiasm for English.

External Factors

Teachers: All lecturers, experts in English, support students in achieving their learning goals. Factors affecting comprehension include teachers' academic background, teaching abilities, physical condition, and digital literacy.

Teaching Design: Effective preparation for College English courses is crucial. Lecturers clarify teaching objectives, discuss content with colleagues, and incorporate interesting information and activities into their lesson plans to maintain student engagement.

Technologies and Media: Various technologies and media, such as PPTs, teaching systems, and learning platforms, provide students with abundant information and enhance engagement and motivation.

Interaction: Frequent interaction with students is essential for addressing teaching challenges. Lecturers agree that increased interaction facilitates problem-solving.

Teaching Models: Modern technologies are integrated into teaching through models such as Communicative Language Teaching, Task-Based Language Teaching, Flipped Classroom, Blended Learning, Collaborative Learning, Autonomous Learning, Problem-Based Learning, and Computer-Assisted Language Learning.

Teaching Evaluation: Diverse evaluation methods, including formative, summative, cooperative assessments, and teachers' scoring, effectively measure and stimulate students' reading comprehension.

Teaching Activities: Activities such as competitive group work, presentations, quizzes, role plays, and brainstorming sessions enhance students' learning motivation and enthusiasm.

Learning Tasks: Due to limited teaching hours, lecturers provide additional tasks and resources for students outside of class to improve comprehension. Modern technologies facilitate online interactions, compensating for the lack of face-to-face consultation.

Learning Environment: Factors like reduced teaching hours and credits negatively impact English learning achievements. These conditions lead to reduced motivation and interest, resulting in a careless attitude and poor performance in class. The detrimental learning environment thus hinders students' English learning progress.

2) Confirming the appropriateness of C-MAEL instructional model to enhance undergraduate students' academic English reading comprehension at Guangxi University of Science and Technology

To serve objective 2, the collected data from 5 specialists of confirming the appropriateness of 5 components of instructional model prior to further implementation were analyzed within 4 areas of standards i.e., utility, feasibility, propriety, and accuracy, and were presented by frequency and percentage of the specialists as shown in the table 3 below.

Table 3 Frequency and percentage of conformability of utility, feasibility, propriety, and accuracy of the instructional model components in 5 areas by specialists

Components of Instructional Model of project-based learning instructional model to enhance undergraduate students' creativity ability	Assessment							
	Utility		Feasibility		Propriety		Accuracy	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
I. Principle & Rationale	5	100	5	100	5	100	5	100
II. Objectives	5	100	5	100	5	100	5	100
III. Contents	5	100	5	100	5	100	5	100
IV. Methods of teaching & Materials	5	100	5	100	5	100	5	100
V. Evaluation	5	100	5	100	5	100	5	100

From Table 5 above, all 5 components of the instructional model of C-MAEL instructional model on students' academic English reading comprehension were 100% confirmed to be appropriate by 5 specialists. These results confirmed the appropriateness of the developed instructional model for further implementation (≥90%).

3) Studying the effectiveness of the C-MAEL instructional model on undergraduate students' academic English reading comprehension

The following table 4 was the results of overall students' academic reading comprehension before and after implementing C-MAEL instructional model for the sample group students in Guagnxi University of Science and Technology (GXUST).

Table 4 Comparison of overall students' academic reading comprehension before and after implementing C-MAEL instructional model

Units	Scores	N	$\overline{X}$	S.D.	t	Sig.
Unit 4	Pre-test scores	39	68.46	15.18	-10.84	.00
	Post-test scores	39	87.69	7.89		
Unit 5	Pre-test scores	39	64.62	13.97	-12.98	.00
	Post-test scores	39	86.22	9.00		
Overall	Post-test scores	39	86.22	9.00	-15.91	.00
	Post-test scores	39	86.22	9.00		

*p<.05

From table 4.14, it can be found that Pre-test was different from Post-test by using Collaborative Mobile-Assisted English Learning (C-MAEL) instructional model. The mean scores of Post-test ($\overline{X}$ = 86.96, S.D. =7.48) was significantly higher

than the mean scores of Pre-test ($\overline{X}$ =66.54, S.D. = 10.31). It revealed that students acquired better academic English reading comprehension after the implementation of C-MAEL instructional model. The paired sample t-test in one-sample group further showed the t-value (t=-15.91) and p-value (p=.00), which indicated that the differences between Pre-test and Post-test were statistically significant at the level of .05 (*p < .05).

Similar conclusion can be drawn by comparing the Pre-test and Post-test in Unit 4 and Unit 5. Both of the mean scores of Post-test in Unit 4 ($\overline{X}$ = 87.69, S.D. = 7.89) and in Unit 5 ($\overline{X}$ = 86.22, S.D. =9.00) were respectively higher than the mean scores of Pre-test in Unit 4 ($\overline{X}$ = 68.46, S.D. =15.18) and Unit 5 ($\overline{X}$ = 64.62, S.D. =13.97). And t-value and p-value in Unit 4 (t=-10.84, p=.00) and Unit 5 (t=-12.98, p=.00) confirmed the statistical significance of the differences between Pre-test and Post-test in these two treatments. Therefore, it can be summarized that the implemented C-MAEL instructional model influences students' academic English reading comprehension at significance level 0.05.

Discussions

In the study "The Effectiveness of Collaborative Mobile-Assisted English Learning (C-MAEL) Instructional Model for Enhancing Academic English Reading Comprehension of University Students in Guangxi Province," the researcher examined several key areas.

Factors Affecting Academic English Reading Comprehension Questionnaire results from three universities in Guangxi Province revealed that internal factors were more significant than external factors in influencing academic English reading comprehension. For instance, four of the top five factors were internal, while the bottom five were external. These findings align with previous research (Yang, 2021; Liao, 2022; Mahmoudi, 2015). Internal and external factors also influenced each other: external factors supported internal factors by fostering motivation and engagement, while internal factors helped students utilize external resources effectively (Li, 2014; Li, 2016; Chen & Quan, 2018). Furthermore, internal factors interacted, with increased motivation leading to greater engagement, which in turn boosted confidence and motivation (Chen & Quan, 2018; Hutchins, 1996; Salomon, 1996).

The C-MAEL instructional model, confirmed by five specialists, was designed to address the needs identified in objective 1. It integrates Mobile-Assisted Language Learning and Collaborative Learning, comprising five components: Principles & Rationale, Objectives, Contents, Methods & Materials, and Evaluation. The model adheres to four standards: utility, feasibility, propriety,

and accuracy. It includes four stages: Preliminary, Enactment, Collaboration, and Evaluation, ensuring the model's suitability, acceptability, and effectiveness in enhancing students' academic English reading comprehension.

Effectiveness of the C-MAEL Instructional Model Pre- and post-test results showed a significant increase in academic reading comprehension. Literal comprehension was the highest, with critical reading the lowest, likely due to the complexity of academic texts. Interpretation skills showed the fastest growth, followed by critical reading, while creative thinking improved the least. The C-MAEL model effectively enhanced students' interpretation and critical reading skills through collaborative activities and the use of mobile devices, although literary comprehension and creative thinking required more time and strategies for improvement. The results indicate a sharp increase in mean scores from pre-tests to post-tests, highlighting the model's efficacy in improving students' academic English reading comprehension.

Recommendations

Students should prioritize their focus on College English courses, ensuring they dedicate sufficient time and energy to the numerous learning exercises and discussions. By fully engaging in these activities, students can enhance their academic English reading comprehension and achieve better learning outcomes. Additionally, students must effectively utilize Mobile-Assisted

Language Learning, particularly mobile devices. While modern technologies can significantly enhance teaching, their misuse can be detrimental. Hence, students should develop strong self-control and self-supervision skills. Furthermore, students are encouraged to practice reading strategies and apply appropriate ones to improve their understanding of academic reading materials, bridging the gap between high school and university English reading focuses.

Lecturers need to integrate modern technologies into their teaching, proactively seeking training on methods and approaches to use these technologies effectively. Improving digital literacy is crucial, as successful integration of Mobile-Assisted Language Learning can lead to unexpected positive outcomes, such as enhanced digital learning environments, increased student motivation, and the development of individual learning styles. Lecturers should also improve their teaching and research abilities, aligning themselves with teaching reform and becoming qualified to teach College English. By understanding factors influencing students' academic reading comprehension, lecturers can implement effective strategies, such as collaborative reading, and provide targeted support to improve students' comprehension levels and achieve learning goals.

University administrators should lead College English reform, conducting in-depth research on national policies and understanding development trends. They should seek advanced educational concepts, update educational goals and methods, and provide support for English education reform. Effective

organizational and management abilities are needed to support reform efforts, including arranging educational resources and coordinating instructional activities. Administrators should also embrace exploration and innovation, supporting technology-based reforms to offer personalized learning plans and diverse opportunities, cultivating students' innovative thinking and practical abilities.

Future research includes the followings.

1. Extended Research on C-MAEL: Due to limited time and content, the current study did not fully explore the effectiveness of the C-MAEL model on higher-level reading comprehension. Future studies should extend the experiment time and content to scientifically and objectively validate the model's effectiveness.

2. Application to Other English Skills: This study focused on academic English reading. Future research should explore the C-MAEL model's effectiveness on other English skills, such as speaking, listening, or writing, to determine if it enhances overall English learning achievements. Additionally, considering the psychological and emotional aspects of second language acquisition could provide deeper insights into internal factors influencing language learning.

3. Broader Application of C-MAEL: The C-MAEL model could be applied to different majors and universities. Mobile-assisted learning integrates modern technologies and teaching, while collaborative learning activates students' internal factors. These principles should be effective across various disciplines and institutions, suggesting the model's broader applicability.

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