Application of mobile-assisted blended learning to College English teaching

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Abstract. The development of information and communication technology in education requires interactive and individualized teaching and deep learning. The current classroom teaching of College English fails to meet the new requirements of the digital era, which leads to a low level of learner engagement and unsatisfying learning outcomes. To meet the needs of millennial students, a mobile-assisted blended course model is designed for College English teaching following the basic tenets of Constructivism and Activity Theory. The model incorporates the strengths of self-directed online learning and face-to-face offline instruction to maximize results by strengthening the role of the teacher as facilitator and defining a clear division of labor between students and the teacher at the pre-class, in-class and post-class learning stages. An experiment with the blended model was carried out in one of the author's College English classes of 28 students for a whole semester and the experimental data were collected through tests and questionnaires. A comparison between the pre-test and post-test scores reveals that students' English language proficiency improves after mobile-assisted blended learning was used for teaching. The survey conducted at the end of the experiment shows that mobile-assisted blended learning helps to motivate students' interest in English learning, increase the degree of learner engagement, and improve learning outcomes. The findings suggest that to produce optimal learning outcomes, the instructor must seek to empower every student to become an active participant in the learning process by breaking traditional boundaries of classroom instruction and embracing new advances in learning technologies.

Keywords: Blended learning, mobile-assisted, college english, blended course model, learner engagement, learning outcomes.

INTRODUCTION

College English is an important compulsory course open to all non-English majors in China's universities. In spite of several rounds of instructional reforms, the traditional classroom teaching of College English is still confronted with a low degree of learner engagement and thus low teaching efficiency. As internet technology advances, College English teaching has been presented with an unprecedented challenge for instructional change and innovation due to the change of learning styles (Lv, 2021). With the wide use of mobile internet devices, mobile-assisted language learning has been gaining increasing popularity among college students as an effective supplement to traditional offline learning. Mobile

learning technologies provide learners with immersed, ubiquitous, ecological, and customized learning contexts that greatly facilitate the learning experience (Han and Gao, 2020). Several studies have shown that blending physical classroom delivery and self-paced online learning provides various benefits over using any single learning delivery type alone (Lv, 2021; Li and Gao, 2021; Lai and Li, 2020; Ge, 2018). Based on the new requirements of the digital era on learning and teaching, the present study designs and applies a mobile-assisted blended learning course model to College English teaching and tries to find out whether the blended course model can increase learner engagement and improve

learning outcomes.

LITERATURE REVIEW

What is blended learning?

Blended learning refers to a learning program in which more than one learning delivery mode is being used to optimize the learning outcome (Singh and Reed, 2001). To highlight the focus on the learning outcome rather than the mixing of different delivery modes, Singh and Reed (2001) refined their definition to say "Blended learning focuses on optimizing achievement of learning objectives by applying the 'right' learning technologies to match the 'right' personal learning style to transfer the 'right' skills to the 'right' person at the 'right' time". Four principles are embedded in this definition: 1) Importance is attached to the learning objective rather than the method of delivery; 2) Different personal learning styles should be supported to serve broad audiences; 3) Different knowledge is brought into the learning experience; 4) The most effective learning strategy is often "just-what-I-need, just-in-time"(Singh and Reed, 2001). Prof. He Kekang, one of the founders of China's educational technology discipline, defined blended learning as combining the advantages of traditional learning and e-learning, which not only highlights the guidance, inspiration and supervision of the teacher but also strengthens the enthusiasm, initiative and innovation of the learner as learning subjects (He and Fu, 2017).

Blended learning can come in different forms. Singh and Reed (2001) categorized five dimensions of blending: blending offline and online learning; blending self-paced and live, collaborative learning; blending structured and unstructured learning; blending custom content with off-the-shelf content; blending work and learning. Margaret Driscoll (2002) put forward four forms of blending: combining modes of Web-based technology (e.g., live virtual classroom, streaming video, audio, etc.) to accomplish an educational goal; combining various pedagogical approaches to produce an optimal learning outcome with or without instructional technology; combining any form of instructional technology with face-to-face instructor-led training, and combining instructional technology with actual job tasks.

Blended learning in EFL teaching and learning

In recent years, blended learning has become a hot topic in EFL teaching and learning (Hashemi and Kew, 2020). A review of the current literature revealed that blended learning helps to develop language skills (Ja'ashan, 2015; Albiladi and Alshareef, 2019; Hashemi and Kew, 2020), enhance the English learning environment, and promote students' motivation for learning English (Albiladi and Alshareef, 2019; Zhang, 2021).

Different teaching experiments were carried out to find out the effects of blended learning in EFL teaching and learning (Lv, 2021; Li and Gao, 2021; Ahmed, 2019). Lv Xiaomin's experiment (2021) of integrating MOOC and traditional teaching methods scored remarkable effects in improving teaching effectiveness and cultivating students' autonomous learning ability and critical thinking, but taking MOOC as the major online learning source leads to a lack of effective supervision of learning process. Li Li and Gao Yanhong (2021) proposed the construction of an "inquiry learning community" and four core elements for blended learning design: situation, interaction, experience and reflection to achieve deep learning. Their teaching experiment confirmed that the blended learning design has a positive effect on students' deep learning, but how the teacher provides scaffolding and how the work is divided between individuals within the community at pre-class, in-class and post-class learning stages are not clearly stated. Ahmed (2019) examined the pedagogical role of WhatsApp as one of mobile-assisted language learning applications and found that WhatsApp was effective in developing students' motivation to improve their reading and writing skills and was embraced by students as a pedagogical tool for learning English, but how to blend mobile-assisted learning with traditional classroom learning to give full play to the strengths of both teaching approaches still needs further research.

The above studies have shown that the diversity of a blended learning experience is more effective than any single learning delivery mode, be it traditional classroom learning or self-paced online learning. Implementing blended learning has become the main direction of deepening the reform of higher education (He and Fu, 2017) and has been considered as one of the 21st-century skills needed for EFL teaching and learning (Hashemi and Kew, 2020). Compared with other online learning sources, mobile learning applications can provide synchronized interactions, contextualized language use and real-time supervision, which greatly facilitates and complements traditional classroom learning. Therefore, considering the new requirements of the digital era on learning and teaching, mobile-assisted blended learning may serve as a solution to the problems of unsatisfactory learner engagement and low teaching efficiency in College English teaching.

NEW REQUIREMENTS OF THE DIGITAL ERA ON LEARNING AND TEACHING

Technological advancement in the digital era has significantly changed our way of learning and work. The interactive social media and numerous learning applications all around us, mobile learning has become a principal way of learning for today's college students who grew up using computers and long for communication

and interaction in this digital era. To address the needs of millennial students, instructors must provide them with interactive instruction, individualized training and deep learning as required by the information age.

Interactive instruction means the instruction or education that fully meets the needs of interaction between learning subjects and copes with their subjective demands (Pu *et al.*, 2016). Students' subjective demands in classroom teaching refer to the desire to realize their worth by participating in class activities and interacting with instructors and peers (Ge, 2018). Students might lack motivation and lose interest in the course when instructors fail to satisfy their subjective demands in the teaching process.

Individualized training pays close attention to individual development, which requires respecting individual uniqueness and differences and developing students' autonomy and enthusiasm (Ge, 2018). Individualized training is the natural requirement for education to break standardization in the post-industrial era and give full play to individual potential to realize man's free and all-round development (Pu *et al.*, 2016).

Deep learning is an inevitable requirement of the digital era for education to get out of the current dilemma. In the traditional teaching model, students passively receive information and mechanically process what is presented to them, which fails to fully mobilize students' sense of participation, internal motivation and interest in learning and finally deprives students of learning motivation (*Pu et al.*, 2016). Deep learning is a type of active inquiry learning which engages students in deep information processing, active knowledge construction, and effective knowledge transfer (Zeng *et al.*, 2016). Characterized by problem-solving and discovery learning, deep learning helps to stimulate students' interest in learning and motivate them to complete the internalization and transfer of knowledge through a process of questioning, analyzing, drawing conclusions, and making recommendations (Pu *et al.*, 2016; Li and Gao, 2021).

BENEFITS OF MOBILE-ASSISTED BLENDED LEARNING IN MEETING THE NEW REQUIREMENTS

A single delivery mode inevitably limits critical knowledge transfer in some form or fashion. For example, a traditional classroom learning format may not be able to support as many different personal learning styles as mobile learning (Singh and Reed, 2001). With the help of portable mobile devices, like smartphones, tablet computers, electronic pens and even wearable devices, mobile learning provides personalized, interactive and ubiquitous learning activities, such as participating in course management, watching MOOC, SPOC or other types of course videos, having peer discussion and evaluation, and playing instructional video games (Han and Gao, 2020). Taking advantage of different learning

delivery modes, mobile-assisted blended learning has the following benefits in fulfilling the new requirements of the digital era on learning and teaching.

Strengthening the interaction between learning subjects

Mobile-assisted blended learning makes use of different instructional mobile apps which provide a unified entrance and learning navigation map. On the instructional app, instructors can upload learning resources, issue learning notices, assign individual homework and group tasks, and provide online tests. After finishing an assignment or a course of study, students can freely share their answers and views in the Q&A or discussion sector of the app and get instant feedback from peers and instructors. Mobile apps build multi-dimensional communication channels for instructors and students and provide powerful technical support for interactive learning and instruction (Ge, 2018).

Supporting different personal learning styles

Blended learning model provides the student with flexible learning styles due to a free learning schedule (Lv, 2021). In the mobile-assisted blended learning model, students are given more freedom to choose the most suitable way of learning. They can manage and control their learning pace and focus according to their specific learning needs and personal learning styles. Mobile apps provide customized digital tools that enable students to pursue self-directed learning paths, such as course task management, online collaboration, and peer mentor matching. Students are encouraged to make full use of fragmented time for fragmented learning and improve learning efficiency. At the same time, with the help of the combined performance analysis presented by the digital platform, instructors can monitor students' course progress and accordingly make timely adjustments to teaching content and approach to better respect students' differences and improve individualized instruction (Ge, 2018).

Facilitating deep learning

Li and Gao (2021) experimented on a blended learning design and proved that blended learning has a positive effect on the deep learning of students. The learning field constructed by mobile-assisted blended learning is different from that of traditional physical classroom learning. It is "an objective network between multiple subjects with the acquisition and possession of cultural capital as the core" (Pu *et al.*, 2016). In this network, students use the digital platform to solve problems
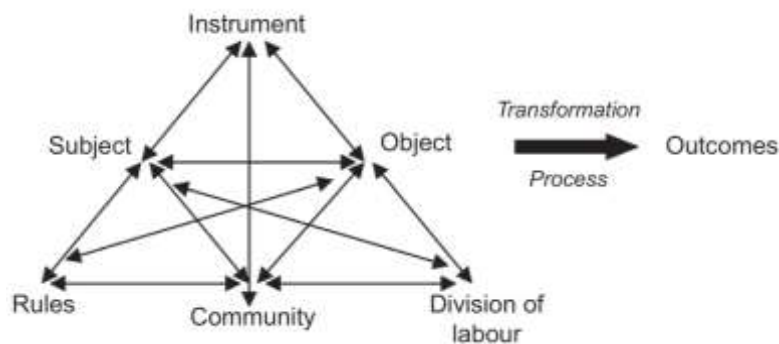
Figure 1. Engeström's extended activity system (McAvinia, 2016).

through communication with instructors or peer-to-peer discussion. In the blended learning process, students internalize knowledge at least three times respectively at the three stages of learning: pre-class autonomous learning, in-class communication and discussion, and post-class knowledge consolidation. Throughout the process, students no longer passively acquire knowledge, but actively construct knowledge, critically process the received information, and finally achieve effective knowledge transfer, changing surface learning into deep learning (Ge, 2018).

To better meet students' needs for interactive, personalized and deep learning in the digital era, a mobile-assisted blended course model was designed for College English teaching under the guidance of Constructivism and Activity Theory.

THEORETICAL FRAMEWORK

Constructivism

Constructivism is an educational theory built around the idea that knowledge is not simply acquired but is constructed in the mind of a person during the learning process (www.wise-geek.com). Constructivism postulates that learning is an active, contextualized process of constructing knowledge based on personal experiences and hypotheses of the environment. The learner is not a blank slate but brings past experiences and cultural factors to learning new material. Learners create their subjective representations of objective reality by way of assimilation and accommodation. By assimilation, a person incorporates new information into his or her pre-existing knowledge. Accommodation, on the other hand, deals with the incorporation of new knowledge that changes the existing knowledge of a person (www.wise-geek.com), or in other words, "using newly acquired information to revise and redevelop an existing schema" (www.buffalo.edu).

These ideas shed light on pedagogical approaches. Since knowledge cannot be directly imparted to students,

the teacher should act more as a facilitator by providing experiences to help guide students toward discoveries and constructing knowledge for themselves. Learning is by nature a social process embedded within a social context in which students and teachers work together to build knowledge, so the goal of teaching is to design experiences and engage students in learning experiences rather than simply deliver information (www.buffalo.edu).

Activity theory

Activity Theory (AT), originally put forward by Lev Vygotsky and further developed by A.N. Leont'ev, proposes that human activities are undertaken under certain conditions and mediated by particular tools, instruments or artefacts to meet a purpose or object (McAvinia, 2016). For Vygotsky, the human mind is not an objective entity but is developed through activity and the construction of artefacts is part of human development. According to Vygotsky, any human activity can be described and analyzed as object-oriented action mediated by cultural tools and the human subject uses tools or artefacts to achieve an object (McAvinia, 2016). In Vygotsky's simple meditational model, the object motivates the activity that is mediated by artefacts, sometimes called tools, instruments, or technologies. Leont'ev extended the model by proposing that activities also depended on a division of labour between individuals within the community for that activity. In the 1980s, Yrjö Engeström diagrammatically represented Vygotsky's meditational model and Leont'ev's extensions in his *Extended Activity System* as shown in Figure 1(McAvinia, 2016).

Engeström's system indicates that the subject's activity to pursue an object is not only mediated by instruments or tools, but also mediated by the community of which he/she is a member, the "rules" of that community (which may be laws, conventions or tacit conditions), and a division of labour which sees the activity shared among members of the community. The bidirectional arrows
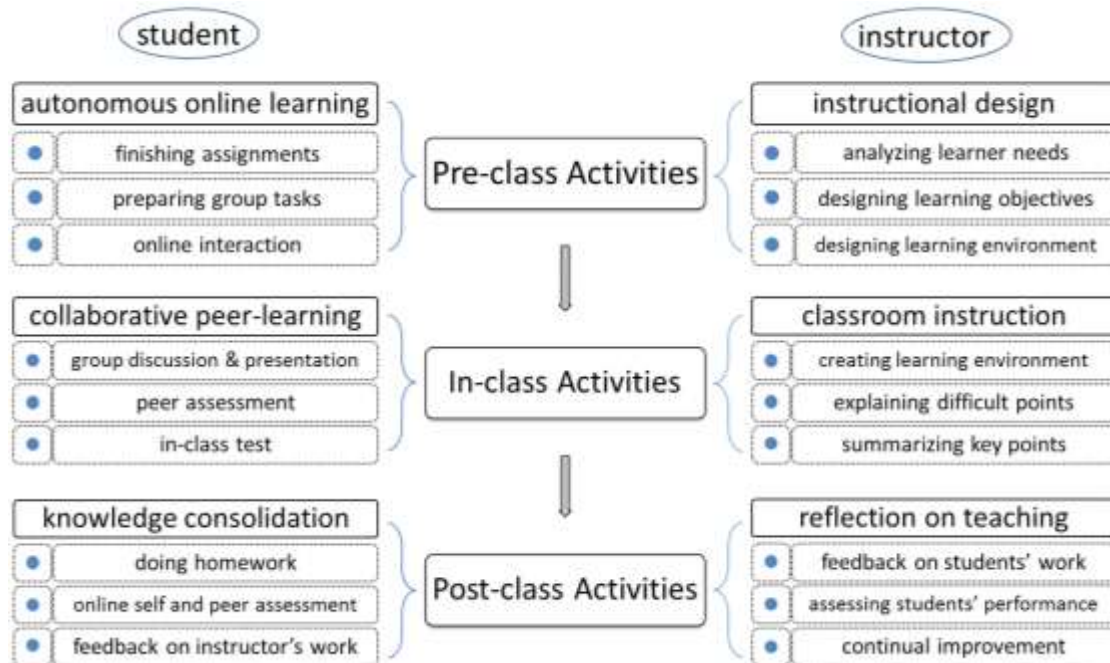
Figure 2. College English mobile-assisted blended course model.

suggest all these nodes interact with each other. The process of subject working towards an object using an instrument leads to an outcome that may be unintended or even undesired (McAvinia, 2016).

In a learning context, the subject is the learner and the object is the learning objective. The community refers to the participants who complete the learning process together with learners. In learning activities, the community constantly influences the subject by providing guidance and resources. The instrument in the instructional design refers to the learning environment, including hardware and software tools. Rules can include modularized structure, cancellation of tutorials in one subject, course requirements, assessment requirements, administrative requirements, timetable, and examinations. In the context of a classroom, the division of labour follows the designated roles of everyone: teachers, students, teaching assistants, and departmental administrators who work together to achieve the object (Lai and Li, 2020). AT highlights the interaction and contradiction between learners and the community and emphasizes that learners' situation, initiative and learning objectives can drive or restrict their involvement in learning (Han and Gao, 2020).

METHODOLOGY

Objectives

The study is expected to explore and design a mobile-assisted blended course model in view of the new requirements of the digital era on education and find out whether the blended model can improve learner engagement and learning outcomes after applying it to College English teaching.

Research hypothesis

Mobile-assisted blended learning can better improve students' integrated skills of the English language and better motivate students to learn English than the traditional classroom learning alone.

Participants

28 non-English majors at the author's university participated in the study. They were from the same College English class taught by the same teacher before and after the experiment.

Design of the mobile-assisted blended course model for College English teaching

The mobile-assisted College English blended course model, designed in accordance with the concepts of "knowledge construction" and "artefact-mediated and object-oriented action", takes a broader view of teaching by integrating pre-class activities, in-class activities, and post-class activities into one learning process as shown in Figure 2. It takes advantage of offline and online

learning to produce an optimal learning outcome. The model strengthens the role of the instructor more as a facilitator than a teacher to help learners achieve the intended object. In this model, two major mobile apps are used for online learning: WE Learn App and The Mosoteach App to which the author's university has easy access since it has paid the service fee. WE Learn App offers the supporting mobile learning resources of the textbook, including language focus, text analysis, listening practice, translation and writing exercises, tests, and extracurricular supplements. It also provides synchronized learning data to help the instructor supervise the whole learning process. On the Mosoteach App, the instructor can upload learning resources (e.g. syllabus, timetable, course requirements, micro video-lessons, etc.), assign and correct homework, organize discussions and quizzes, whereas students can check and download all learning materials, submit homework, interact with the instructor and other students, etc.

Pre-class activities

Instructor's instructional design: The instructor uploads preview resources (micro video-lectures, exercises, specific topics for discussion, etc.) on the Mosoteach App, assigns supporting preview tasks on the WE Learn app, collects students' learning data, and analyses learner needs on the basis of data analysis. The results of learner-needs-analysis help the instructor design learning objectives, teaching/learning approaches and tools, teaching/learning content, and assessment methods.

Students' autonomous online learning: Students carry out a series of online, self-paced and collaborative learning with the help of the two mobile apps: finishing assignments, preparing group tasks, asking questions, discussing related topics with peers and the instructor. In the multi-dimensional interaction and communication, students' subjective demands are satisfied and the first internalization of knowledge is realized.

In-class activities

Instructor's classroom instruction: The instructor designs classroom learning tasks according to the major difficult points reflected in students' pre-class discussions and exercises on the apps, organizes class discussions on common questions and encourages students to actively share their personal views. After students' group presentations, the instructor explains difficult points, comments on students' views and performance, and guides students towards constructing a knowledge system by summarizing the key points.

Students' collaborative peer-learning: Students present

their individual work or group research work, for example, explaining the text background, author's style, the theme of the text, text structure, etc and raise questions that remain unresolved after pre-class group effort. Students from other groups will ask and answer questions, share what they learn, and assess peers' performance. Group discussion and class communication deepen students' understanding of the text and sharpen students' English language skills. At this stage, students complete the second internalization of knowledge.

Post-class activities

Instructor's reflection: The instructor assigns homework on the apps and gives feedback on students' typical errors or common problems. The feedback can help students further consolidate knowledge, clarify concepts, apply what they have learned in class to practice, and finally complete the third internalization of knowledge to achieve the purpose of in-depth learning. After a unit's learning, the instructor assesses students' performance in autonomous learning, class involvement, teamwork, homework, and tests, collects the formative assessment data, and reflects on continual improvement measures.

Students' knowledge consolidation: Students consolidate newly constructed knowledge by doing homework and analyzing what they gain and what needs to be improved in light of the learning objectives. Besides self-assessment, students also assess their peers' work and the instructor's teaching, the result of which can help the instructor adjust teaching approaches, teaching content, and assessment methods to better help students achieve the learning objectives.

The model promotes the organic unity of three nodes: pre-class blended learning, in-class collaborative learning and post-class blended learning by effectively connecting the systematic components: the instructor, the learner, teaching materials and learning environment. In this model, the instructor provides scaffolding to help learners build and internalize knowledge for themselves. All members of the learning community have a clear division of labor and work together to achieve the intended object by using different mediating instruments (apps, micro-videos, audio and text materials, etc). Various offline and online learning activities are carried out to promote interactive, individualized and deep learning, which helps improve learner engagement and learning efficiency.

Instruments and data collection

Test

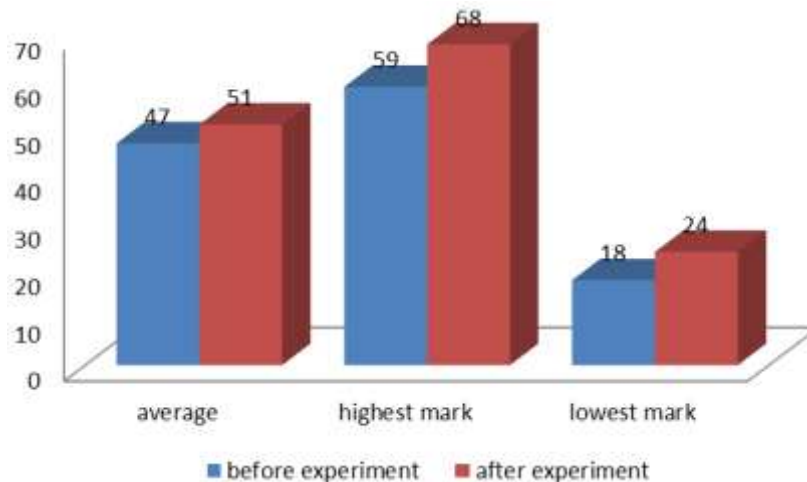The course of College English at the author's university is

Figure 3. Differences in test results

open to freshmen (non-English majors) and lasts only for one academic year (two semesters). At the end of each semester, a final exam based on what students have learned for the semester is given to test students' proficiency in English. In the first semester of Academic Year 2020-2021, the author' College English class (28 students) learned College English in the traditional classroom learning mode; in the second semester of the same academic year, the mobile-assisted blended model was tried and applied to the same class. At the end of the experiment, the students took the final exam which had the same question types as that of the first semester: writing, vocabulary and grammar, cloze, reading, and translation. The results of the two final exams were compared to see whether the blended course model could improve students' learning outcomes.

Questionnaire

Upon completion of the second semester's learning, the 28 students were asked to fill in a questionnaire which consisted of two parts. Part one was about students' attitudes towards the effect of the blended course model, using a 5-point Likert scale. In part two, students assessed whether they attained the four learning objectives designed for the course, using binary questions. 28 questionnaires were collected.

RESULTS AND DISCUSSION

Mobile-assisted blended learning can better improve learning outcomes

The average mark, the highest mark and the lowest mark of the pre-test and post-test were compared and the result is shown in Figure 3.

The comparison between the two exams shows that students' average increased by 4 marks and the highest mark and lowest mark increased by 9 marks and 6 marks respectively. The rise in the marks reveals that the blended course model contributes to the improvement of students' learning outcomes. Lv Xiaomin (2021) obtained the same result from her experiment on blended teaching mode by integrating MOOC and traditional teaching methods in College English classes. To understand the significance of the rise, one factor needs to be taken into account. The experiment class is ranked as Level B Class according to their English test result in College Entrance Exam. Their English level is much lower than Level A Class and most of them lack interest in learning English. Considering their general level, the rise of 4-9 marks after the teaching experiment can be reliable evidence to show the effect of the blended course model.

In addition, it can be found from the survey that more than 85% of the students agreed that they had attained vocabulary, reading and translation learning objectives as reflected in Table 1. 21.4% of the students thought they failed to attain the writing objective, which shows writing is still a difficult skill for students to develop, so more online and offline tools should be designed to hone students' writing skills in future teaching. The fact that the majority of the students surveyed thought that they had attained all the learning objectives reveals that mobile-assisted blended learning can help improve learning outcomes.

Mobile-assisted blended learning can better motivate students' learning interest and increase their engagement in English learning

As shown in Table 2, all 28 students are favorable to the blended model for its strength in meeting learning needs and improving learning effect. 85.7% of the surveyed

Table 1. Students' self-assessment of attainment of learning objectives.

Learning objectives	Attained (%)	Not attained (%)
1. Vocabulary: be able to explain the meaning of the CET4 vocabulary and phrases learned in this course and use them in the correct context.	89.3	10.7
2. Reading: be able to read English articles with general topics, understand the main idea and the author's views, and analyze the main facts and relevant details.	85.7	14.3
3. Writing: be able to write on general topics in English clearly and coherently.	78.6	21.4
4. Translating: be able to understand the syntactic differences between English and Chinese, and translate between the two languages to achieve cross-cultural communication purposes.	89.3	10.7

Table 2. Students' attitudes towards the effect of the blended course model.

Effect of the model	Strongly agree (%)	Tend to agree (%)	Neither agree nor disagree (%)	Tend to disagree (%)	Strongly disagree (%)
1. The online resources provided by the teacher met my learning needs.	85.7	14.3	0	0	0
2. Compared with the traditional classroom learning model, the blended model better motivated my learning interest and did well in engaging me in learning.	85.7	10.7	3.6	0	0
3. The blended model promoted my independent learning as well as collaborative learning.	89.3	7.5	3.2	0	0
4. The blended instructional design improved my learning effect.	82.1	17.9	0	0	0

strongly agree and 10.7% tend to agree that the blended model did better than the traditional classroom learning model in motivating learning interest and improving learner engagement, whereas the other 3.6% remain neutral. As to whether the model can promote both independent learning and collaborative learning, 89.3% of the students strongly agree, 7.5% tend to agree, and only one student stays neutral. The result of the survey reveals that the mobile-assisted blended course model does better than traditional classroom learning in stimulating learning interest, increasing learner engagement and improving the learning effect. Similarly, Lv Xiaomin (2021) and Li and Gao (2021) proved in their teaching experiments that blended learning has scored remarkable effects in improving teaching effectiveness and learner engagement. Therefore, the blended model can be recommended as an effective way to address the problem of low learner engagement and learning inefficiency faced by current College English teaching.

In a word, the blended course model has produced the desired outcome of improving teaching efficiency and learning effect. What should be done in the future is to design more effective instruments and learning environments by taking advantage of online and offline learning strengths to facilitate language learning. The positive effect of mobile-assisted blended learning on College English teaching can provide some insight into the teaching and learning of other subjects in view of its strength in increasing learner engagement and improving learning outcomes.

CONCLUSION

In the new digital era when information technology is being constantly integrated into instruction, blended learning has become an irreversible trend driven by a demand for more interactive, individualized and efficient instruction. The mobile-assisted blended course model, following the important principles of Constructivism and Activity Theory, highlights students' subject status by giving them the greatest possible chance to move toward discoveries for themselves. The experiment of applying the blended model to College English teaching has

proved that mobile-assisted blended learning not only increases learner engagement and learning efficiency but also improves learning outcomes, as revealed by the test as well as the survey. A future study based on an enlarged experiment scope and an extended experiment period may better exhibit the effects of mobile-assisted blended learning.

In conclusion, mobile-assisted blended learning is of positive significance in shaping a more inclusive and open education ecosystem. As Harvi Singh and Chris Reed (2001) put it, blended learning provides a more natural way of learning and work. In order to salvage College English teaching from its current predicament, College English teachers must look beyond the traditional boundaries of classroom instruction by augmenting their current best practices with new advances in learning and collaboration technologies. Finally, teachers should inspire and empower every student to become an active participant in the learning and collaboration process to maximize learning outcomes.

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