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Visual translation of English classroom teaching system based on mobile learning

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Abstract: China's education is undergoing a new transformation. The development of the times requires that the teaching method of English translation change from 'teacher-led' to 'student-led', and intuitive classroom teaching is particularly important. Based on 'mobile learning', this article proposes a new model of English translation teaching that is different from the traditional teaching method. By introducing 'mobile learning' to compare the traditional teaching model, this article proposes a new model of English translation classroom teaching that meets the requirements of the times to solve objective problems such as the single translation method in the English classroom teaching system. The comparison results show that compared with the traditional English translation teaching model, the new model based on mobile learning has increased student satisfaction by 25%, and in terms of student freedom, English scores have increased by 23%. The learning effect index has increased from 0.43 to 0.7 and the student time freedom score has increased from 2.0 to 3.6 (five-level scale). It also shows that the English translation teaching model based on mobile learning is more in line with the times and is of great significance to students in English translation teaching classrooms.

Keywords: classroom teaching system; English translation; classroom teaching; mobile learning.

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1 Introduction

The traditional teaching method is mainly to instil knowledge into students, while students accept it passively. Therefore, in some language courses with extended and strong practicality, students' learning efficiency is low due to less class hours, heavy teaching tasks, and difficult teaching by teachers. With the rapid development of mobile learning technology, more and more learners hope to improve their English translation skills through flexible and convenient methods. Therefore, effectively integrating mobile learning in classroom teaching has become an important requirement. This article aims to explore how to build a visual teaching system to enhance students' interactivity and learning effectiveness in the translation process while ensuring data security and privacy protection when using mobile devices.

Translation in English teaching can effectively promote the overall development of English, as shown in Figure 1. With the development of global economic integration, the economic and trade cooperation between China and the world has become increasingly frequent, and the competition among countries has become increasingly fierce. Today, the official language of many countries is English, and English is the most widely circulated language. In the field of higher education, this trend is reflected in three changes: from single-text translation to cross-cultural communication skills training, from one-way classroom teaching to ubiquitous learning supported by mobile terminals, and from standardised tests to personalised assessments based on big data. According to data from a certain university in 2022, 85% of foreign-related professional courses have integrated mobile learning platforms, among which the cybersecurity incident reporting rate of translation courses has dropped by 40% year-on-year.

This article compares students' satisfaction under the two modes, students' time freedom, learning effect, and English achievement. The comparison results show that the visual English translation classroom teaching based on mobile learning has greatly improved the students' satisfaction compared with the traditional English translation teaching. Students' free space has become larger; their learning effects have been strengthened; their enthusiasm for learning has been greatly improved; their English scores have also risen by a grade. It also shows that the visual English translation classroom teaching based on mobile learning is feasible in the teaching system.

'Visual translation' in this study refers specifically to a translation teaching model implemented through interactive visual tools integrated into mobile terminals (such as dynamic word clouds, real-time speech-to-text, and bilingual video annotation). Its core features include:

1 using AR technology to superimpose virtual translation scenes

2 realising syntax tree visualisation through the instant feedback system of mobile applications.

2 Related work

English is a language with its own unique cultural characteristics, and the translation of English can also involve national policies. Li studied the translation and introduction strategies of contemporary Chinese novels by American readers during the anti-Japanese War. The study found that some of the political, diplomatic, and cultural policies of the USA and China were unclear. As the war progressed, the motivations and policies of policymakers were constantly changing (Li and Tian, 2021). Najjar studied hyperbole in the Quran and its translation into English. The formal transformation of the two curves was mainly explored, and the role of different translation strategies in data translation was explored. In this context, translators often adopt a variety of translation methods such as literal translation, paraphrase, transposition, and morphology, and transposition is the most common one. Sometimes, this method is exaggerated in the Quran (Najjar et al., 2021). From a cultural point of view, translation is a kind of cross-cultural communication. The translator's way of thinking may also undergo profound changes in different cultural backgrounds. From the perspective of contemporary translation, cultural differences are very important in the field of translation. Zhang (2021) discussed the contextual connection and practical experience in Chinese and English from the perspective of English-Chinese cultural background, and understood and practiced translation from a cultural perspective. In English translation, relevant scholars have carried out research from various aspects, but in the classroom teaching system, scholars have little research on the application of English translation in the classroom.

Technology is advancing by leaps and bounds compared with traditional teaching, and classroom teaching modes are constantly changing. With the popularisation of mobile phones, the breadth and goals of mobile learning have attracted more and more attention in survey teaching. Crompton conducted a survey of mobile learning in PK-12 education 2010–2015. The results showed that the researchers used mobile learning that matched the behaviourist learning style 40% of the time (Crompton et al., 2017). Hsieh conducted a phenomenological analysis of teachers' concept of mobile learning. Fifteen middle school teachers in five northern Taiwan regions participating in the National Mobile Learning Project participated in the survey. Data collection was conducted using semi-structured interviews to analyse six different motor learning concepts. Conceptual categories constituted the hierarchy and represented concepts ranging from teacher-oriented/content-oriented to learner-oriented (Hsieh and Tsai, 2017). Antun targeted the use of mobile phones and computers in three national vocational education and training schools (VETs) in Europe, and mainly discussed mobile phone usage habits, the influence of mobile phone applications on teaching, and the choice of mobile teaching. The survey showed that middle school students had a high rate of mobile phone usage every day, but they had no experience in ICT-assisted mobile phone teaching (Antun et al., 2017). In the past ten years, the world has been discussing the related issues of mobile learning; however, there is no systematic research on mobile technology's application development and development trend in nursing teaching. Chang analysed the

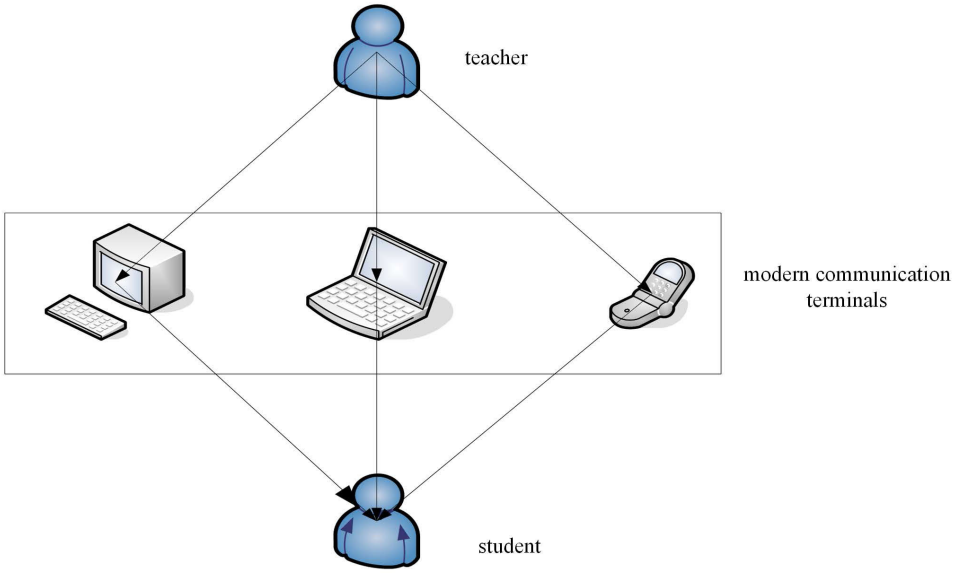
application of mobile technology from the aspects of application fields, disciplines, learning strategies, etc. and investigated the existing problems. In nursing teaching and training, mobile phone technology has made great progress. In recent years, with the continuous development of mobile phone technology, mobile learning research in nursing teaching has been increasing, and the disciplines and scientific research issues have become increasingly diversified (Chang et al., 2018). The way of mobile learning is slowly approaching in classroom teaching; the visualisation of English translation in classroom teaching system based on mobile learning is discussed. The application of mobile learning in the field of English translation teaching is gradually deepening, helping students to understand translation content more accurately, optimise learning paths, and promote the development of translation teaching towards intelligence and interactivity.

3 Mobile learning English translation classroom teaching system

3.1 Current situation and core advantages of mobile learning in various countries

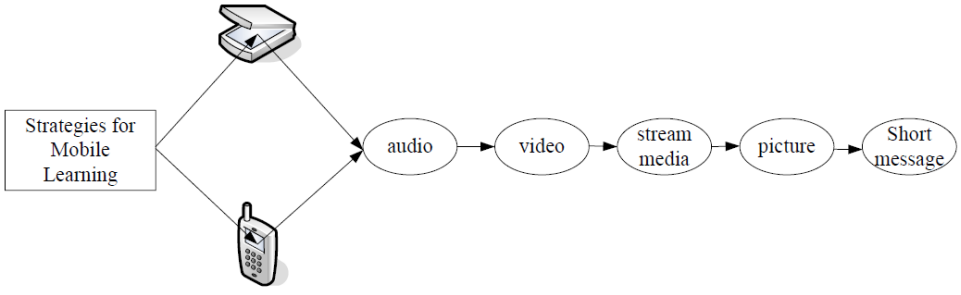
Mobile learning is a learning activity conducted through mobile devices, allowing learners to access learning resources and interact anytime, anywhere (Ztemel, 2017). Taking the mobile phone as an example, its portability and multi-function are undoubtedly the best mobile learning terminals, and the technology of smartphones is constantly being improved. With the development of wireless technology and the technological innovation of manufacturers, the performance of smartphones is greatly improved (Peng, 2019). The mobile learning mode is shown in Figure 1.

Figure 1 Mobile learning model (see online version for colours)



China began research on mobile learning in the early 21st century, but it started relatively late, and carried out a large number of activities under the guidance of the Ministry of Education. China's scientific research level is more advanced than other countries, but the depth and breadth of research are low due to the constraints of the technical environment, human resources, and other factors. In recent years, with the rapid development of China's economy, more and more research on mobile learning has been conducted. At present, at the technical level, China's mobile learning strategy is mainly based on mobile learning on PDAs and smartphones and makes full use of audio, video, streaming media, pictures, SMS, network, and other methods. Teaching resources suitable for mobile devices are selected, and advanced technologies are applied. The main strategy of mobile learning is shown in Figure 2.

Figure 2 Approach to the main strategies of mobile learning



In the field of literature, CNKI has retrieved 112,055 articles, of which the number of articles in 2013 is 16,891 (Baek and Touati, 2017). Through the research on Chinese books, important journals, and master's thesis on mobile learning in recent years, four problems have been summarised, and it is found there are no special mobile learning books. 'Mobile learning – theory, current situation, trend' and 'mobile learning theory and practice' are important works in the field of mobile learning (Rashevska and Tkachuk, 2018).

In the field of applied research, it mainly focuses on the technical level of mobile learning systems, such as the development of mobile learning systems. For learners' mobile learning applications, it is relatively scattered, and it is difficult to grasp the overall situation (Pulla, 2017).

The research object is the mobile terminal survey report based on mobile learning. For example, the sales and usage of mobile devices in China, but in this case, it is easy to regard mobile learning as a vassal of mobile devices, lacking theoretical basis. Table 1 is a case study of domestic mobile learning applications.

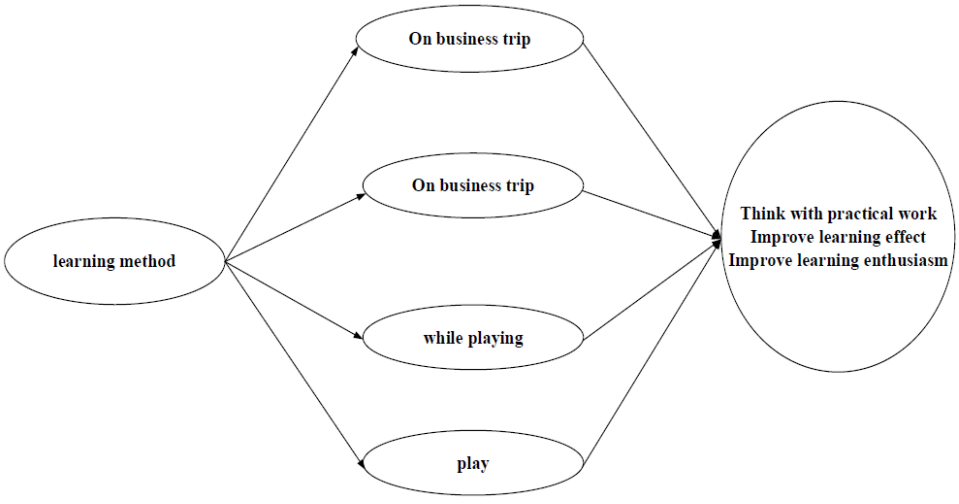
The USA first launched mobile learning. In 1994, one of the universities started a research program called Wire Andrew, which made it easy for students and teachers to teach on mobile phones with the help of wireless communication technology (Parsazadeh et al., 2018). From a global perspective, mobile learning research in Europe is relatively active, and its research and applications are also relatively extensive. The m-learning programme, funded by the European Council, uses advanced, convenient, and easy-to-use technology to provide courses of interest to people who are not employed or have difficulties in life.

Table 1 China mobile learning application cases

Case name	*Time*	*Content*
'Heyuan mobile learning garden' platform	2009	The platform improves the effectiveness of learning and practicing the concept of sustainable development in the form of 'one post a day' every day
Hangzhou Shangcheng district 'mobile learning' project	2012	'Mobile learning exploration' was carried out in mathematics, Chinese, English, art, thinking and other subjects
Happy word field	2013	A customs-clearing word memorisation tool similar to 'Angry Birds', advocating the learning concept of 'shut down without leaving get out of class, learn foreign languages on the go'
'Mobile phone kaleidoscope' mobile learning channel	2014	Selected video courses and the latest video lectures, learners can open their mobile phones to enter the mobile learning channel at any time

Mobile computing technology and internet technology are the basis of mobile learning technology, that is, mobile internet technology (Kim et al., 2017). The implementation tool of the system is a miniature mobile computing device, which does not need to be connected and can be used well even in motion.

Figure 3 Learning methods and functions of mobile learning



Mobile learning has flexible and diverse learning methods and functions, as shown in Figure 3. Whether it is on the way to business or at the platform of the airport, and whether it is in the waiting gap or anywhere, as long as one opens the smartphone or tablet and logs in to the CITIC Learning Platform, one can easily browse the latest information, read new books, and learn courses (Parinsi and Ratumbuisang, 2017). A lot of learning supplementary materials is provided, and a lot of communication and interaction in the teaching are added. The main content of mobile learning is 'Reading+', which allows students to download important information such as learning materials, share experiences, and log in times. Therefore, it is possible to better understand the

students' study habits and motivation, so as to better track and grasp the students' learning situation. Mobile phones are necessary in the mobile era, and the usage rate of smart terminals is increasing every year. When using the mobile learning mode, there is no need to use a computer, and students only need to download to their mobile terminals to participate in the teaching (Wongwatkit et al., 2017).

3.2 Significance of translation teaching in English teaching

Although the expressions of the two are not the same, as long as the word's meaning is clearly stated and described in another language, it is called 'translation method' (Joo-Nagata et al., 2017). That is, according to the author's writing purpose, the original text is described using another language. In translation, there must be a correct understanding. Not only does it focus on the accuracy of language, but it also emphasises the understanding of cultural background, context, and translation skills. Only when the original text is correctly understood can the correct expression and proofreading be carried out in the days to come. It is particularly important for English translation teaching to start from the aspects of language phenomenon, specific content, structure and logic of upper and lower paragraphs. In specific translations, the interaction between English and Chinese can improve the expression ability of English. The goal of English teaching clearly proposes to comprehensively improve students' translation ability. This method is closely related to other non-translation teaching links and is of great significance to English teaching (Meo et al., 2017).

With the development of global economic integration, the economic cooperation between China and the world has become increasingly frequent, and the competition among countries has become more and more intense (Luo et al., 2017). Especially under the framework of the WTO, many Sino-foreign joint ventures have appeared, and the scale of foreign trade has become larger and larger. This requires a large number of people who know both English and Chinese, and the teaching of English translation meets the needs of this era. Now, English is one of the most popular languages in the world and many TV shows are done in English. Some important magazines and books are written in English, and Chinese Government documents are also in Chinese and English. English is a compulsory course for postgraduates, doctors, and masters every year. To study in other countries, the first thing is to pass an English test. Therefore, in order to cultivate one's own talents in the continuous study, it is necessary not only to master the basic English listening, speaking, reading, and writing skills but also to have a good English translation ability (Farhan et al., 2017).

3.3 Existing problems in English translation teaching

One of the main purposes of English education in China is to improve students' English translation level (Hammouri, 2018). However, according to the survey, the current guiding ideology of English teaching in China pays too much attention to English. The setting of English translation courses is not scientific enough, and there are few translation teaching materials for English majors, resulting in a lot of randomness and unsatisfactory teaching quality in the teaching of English translation. English teachers are also aware of this problem and put forward some countermeasures to improve English teaching, so as to improve the level of non-English majors. At the same time, CET-4 also takes English translation as an important part. However, this is not enough. It judges from

the students' daily translation assignments and examinations, and there are still many English translations at a low level. This is because they lack the theoretical knowledge of translation basis. In English teaching, a comprehensive design must be carried out from multiple aspects (Christudas et al., 2017).

English teachers are the practitioners of teaching, and their professional quality, understanding of translation teaching, and teaching methods seriously affect the effectiveness of translation teaching. However, at present, English teachers of English majors do not have a thorough grasp of the theoretical knowledge and translation skills of the translation major, so they do not teach translation in the classroom. Many teachers do not find the correct translation method in the classroom, and they just take out some sentences and let the students translate it by themselves. This not only does not stimulate students' enthusiasm for learning, but greatly affects their learning efficiency.

In addition, students' understanding of translation is also important. Many students mistakenly think that they can translate if they master English, and this concept also affects their learning. According to a survey of a large number of college students, they find that if both English and Chinese are mastered well, the translation level can be improved. College students' English mastery ability is uneven, and it is difficult for teachers to grasp the overall situation and teach students in accordance with their aptitude. Students' knowledge is to improve their English vocabulary only from one aspect, and spend a lot of time on memorising words.

3.4 Implementation of mobile learning algorithm and visual translation system

This system adopts a layered architecture design to build a three-dimensional technical framework including user layer, service layer, and data layer. The user layer integrates the AR scene overlay module and speech transcription engine, realises real-time rendering of virtual translation scenes through OpenGL ES 3.0, and completes spatial positioning in combination with gyroscope data of mobile devices to ensure the accurate overlay of dynamic word cloud and syntax tree visualisation components in teaching scenes. The service layer deploys an NLP processing cluster based on the BERT model, uses bidirectional encoder representation technology to semantically parse the input text, dynamically allocates translation weights through the attention mechanism, and synchronously calls the AES-256 encryption channel of the network security protection module to ensure data transmission security. The data layer uses distributed MongoDB to store structured teaching resources, and establishes a multi-level indexing mechanism to achieve millisecond-level retrieval response for 100,000+ annotated corpora.

The system integrates the textbook corpus and real-time classroom input data through the improved TF-IDF algorithm to build a dynamic adjustment model for word frequency weights. The Three.js three-dimensional rendering engine is used to map word cloud elements to the spherical coordinate system, and semantic zoom and rotation interaction is realised through touch event listeners. The syntax tree visualisation component implements dynamic expansion of syntactic structure based on D3.js, and introduces Oxford syntax tree map as a benchmark template. When it is detected that the deviation between the student translation and the standard grammatical structure exceeds the preset threshold, the error node-red marking mechanism is automatically triggered. The error correction module adopts rule engine technology to dynamically associate the interpretation library of 'Longman Contemporary Advanced English Dictionary' and the

Oxford grammar correction case library according to the error type to generate structured correction suggestions.

The cross-cultural annotation system integrates 214 typical business negotiation case databases and realises pattern recognition of cultural conflict scenarios through a bidirectional long short-term memory network. A double-click trigger mechanism is deployed in the text editing interface. When the cursor stays for more than 300 ms, the cultural annotation bubble automatically pops up, and the zero-knowledge proof protocol is called synchronously to verify user permissions. The security interaction layer uses a dynamic token mechanism to control the sensitive word filtering strategy. The teacher can configure a three-level permission system through the RBAC model to realise the process management of translation content review and cultural adaptability evaluation. The system builds a virtual teaching network through the SDN controller and uses the OpenFlow protocol to realise dynamic traffic scheduling, while ensuring the isolation of teaching data and maintaining an AR scene loading delay of 87 ms.

This article also studies the application of video embedding technology in mobile teaching and introduces a video embedding algorithm based on this technology. To improve the performance of existing video embedding algorithms and the number of hidden video frames, an efficient video embedding algorithm based on coding and information hiding is proposed. The coefficients of adjacent frames are predicted in the IntDCT domain using the correlation between frames, and the secret video is embedded using the predicted difference histogram as a carrier: the secret video is pre-encoded to enhance the transmission efficiency and improve the error resistance of the secret video. The simulation results show that the algorithm effectively improves the number of hidden frames and the quality of the secret video extracted by the receiving end and realises the secret transmission of the secret video. First, compression coding, error correction coding, and interleaving coding are required. Compression coding is based on efficient coding technology and can effectively improve the efficiency of secret transmission. The correlation between images is high, and compression is easy. A high compression rate can be achieved under low distortion conditions. From the perspective of real-time performance, the real-time performance of hidden video after encoding is much better, and the use of error correction code and interleaving code technology can effectively improve the robustness of the video compression code stream.

3.5 Improvement methods for English translation teaching problems

In schools, if one wants to strengthen English translation teaching and reverse the marginalised situation of English teaching, it is necessary to strengthen translation teaching. First of all, combined with the actual situation of the school, the English teaching is reformed and optimised, and elective courses are given to non-English majors. English elective courses should also be added to various types of translation courses, including translation and interpretation. At the same time, elective courses and special lectures on translation can also be used to strengthen the translation teaching. Secondly, it is necessary to strengthen the translation training of teachers and improve the teaching level of translation. Schools should encourage young teachers, especially young teachers, to provide them with more opportunities to listen to translation lectures and training. In this way, young teachers can better adapt to the translation requirements. Finally, schools and relevant educational institutions should do their part to allow students to better understand the translation test in CET-4 English teaching, so that a reliable and

comprehensive evaluation can be made on the language communication ability of English learners, and the teaching of English translation can be made more effective and active.

In terms of teachers, the overall teaching of English translation should be carried out under the guidance of teachers. Therefore, it is an urgent problem for English teachers to change the traditional concept of English translation and improve their translation ability and quality. First of all, English teachers should change the traditional concept of English teaching and pay attention to the teaching of English translation. Therefore, teachers should pay full attention to translation and arrange classroom teaching reasonably. In daily basic courses, teachers should combine the current textbooks and related materials, introduce translation skills into the classroom for analysis and practice, and give targeted guidance to students, so as to deepen the understanding between Chinese and English. Secondly, teachers should strengthen the research on the theory and skills of English translation, and constantly improve their English translation ability and level. Teachers need to actively use school training and other methods to enhance their learning ability, cultivate a sense of lifelong learning, and continuously improve their professional quality to adapt to the new teaching environment. In addition, in the translation of CET-4, teachers need to consolidate and strengthen their understanding of Chinese culture, Western culture, customs, and expand their knowledge in order to better engage in translation work.

In terms of students, the proportion of Chinese paragraph translation scores has increased after the reform. Topics cover Chinese history, culture, economy, and social development. Therefore, after this, students should realise the importance of improving their English translation level and even their comprehensive ability. The comparison before and after the reform is shown in Table 2.

Table 2 Comparison before and after the English translation reform

Test content	*Time*	*Test question type*	*Score ratio*	*Examination time*
Level 4 Chinese to English translation	Before the reform	Sentence (half sentence) translation	5%	5 minutes
	After the reform	Paragraph translation	15%	30 minutes

Therefore, when preparing for the exam, candidates should pay attention to reading more, writing more, and accumulating more. This has to be done in order to do well in both languages. In daily life, students need to increase the amount of Chinese and English in reading, and pay attention to the knowledge of Chinese history, culture, economy, and social development. While expanding the scope of reading, the mutual translation between Chinese and English should also be strengthened. Through such comparison exercises, students can express their meanings correctly, thereby improving the translation accuracy. In addition, in daily reading, students also consciously accumulate some specialised vocabulary. Therefore, the basic knowledge of English grammar, syntax, etc. must have a solid foundation.

A university has created an online translation learning community where students can interact through a mobile application. Students share translation works in the community and comment on each other, and teachers also participate in providing professional guidance. The community also regularly holds online translation challenges. This interactive learning mode increases students' sense of participation and enthusiasm and promotes knowledge-sharing and collaborative learning. At the same time, the feedback

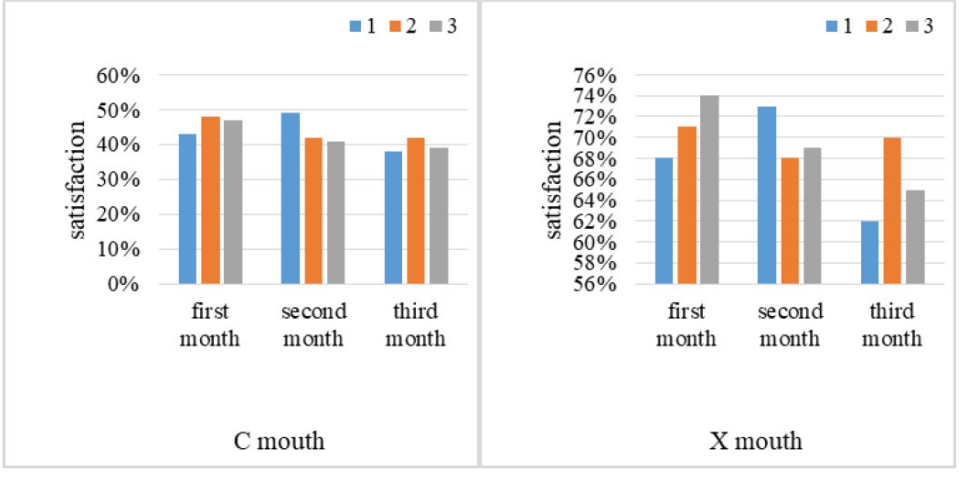
mechanism of students in the community has continuously improved their translation ability.

There is also a university translation course that encourages students to use social media platforms for translation practice. Students need to choose popular topics, translate relevant content into English, and post them on social media. Teachers guide students' translation decisions through comments and feedback. This method not only improves students' translation skills, but also enhances their social media usage skills. Students have reported that they are better able to understand the context and audience needs in translation.

4 Comparison of English translation teaching mode based on mobile learning and traditional teaching mode

In this article, data was mainly obtained through the form of questionnaires. Questionnaires were given to students (Different grades and majors) in a certain university. 300 questionnaires were distributed, and 200 were returned. The number of questionnaires was three times, and the time was three months. The comparison was mainly based on four aspects: students' satisfaction in the two modes (range of 0%–100%, the higher the value, the higher the satisfaction), students' time freedom, learning effect, and English achievement. The comparison chart of satisfaction between the two is shown in Figure 4. The satisfaction rating was based on students' subjective evaluations of two modes, using a Likert scale (1–5 points) for scoring, and then converted to a percentage scale to obtain the final satisfaction data. In Figure 4, the traditional English translation teaching mode was denoted by C, and the English translation teaching mode based on mobile learning was denoted by X.

Figure 4 Satisfaction comparison chart (see online version for colours)



Through the comparison of satisfaction between the two groups in Figure 6, it can be found that the teaching mode of English translation based on mobile learning had a satisfaction rate of about 72% among students, while the student satisfaction of

traditional English translation was only 47%, less than half. It showed that in the current era, students still preferred the English translation teaching mode of the era.

Student freedom is an expression of the degree of physical freedom students have during their studies. There were 5 degrees of freedom: very free, not very free, free, moderately free, and quite free, corresponding to the degrees of freedom from 1 to 5, respectively. The comparison of student degrees of freedom in the two modes is shown in Figure 5.

Figure 5 Degree of freedom comparison (see online version for colours)

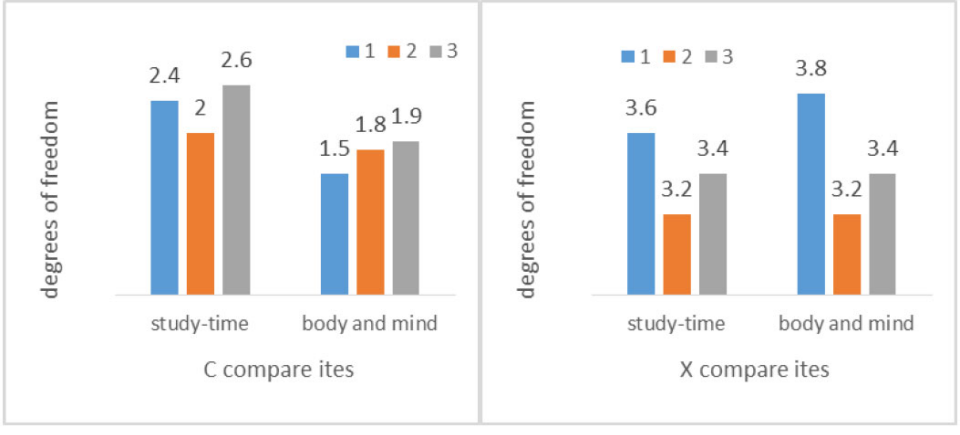
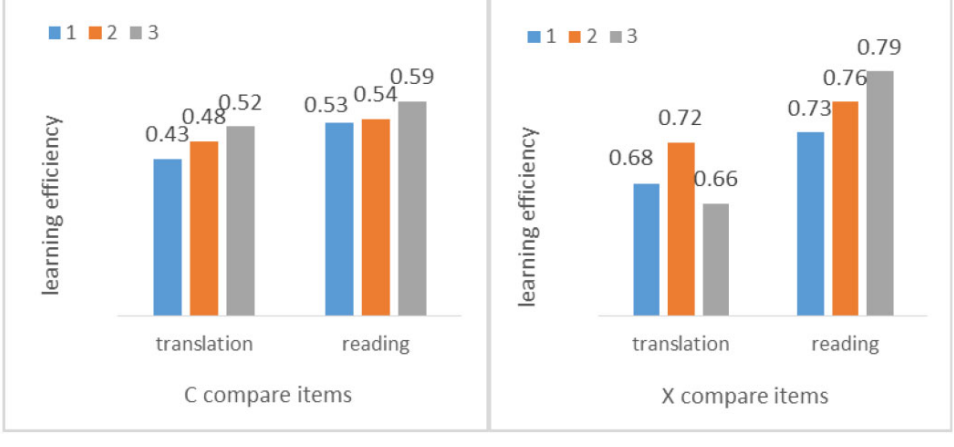


Figure 6 Comparison of learning effects (see online version for colours)



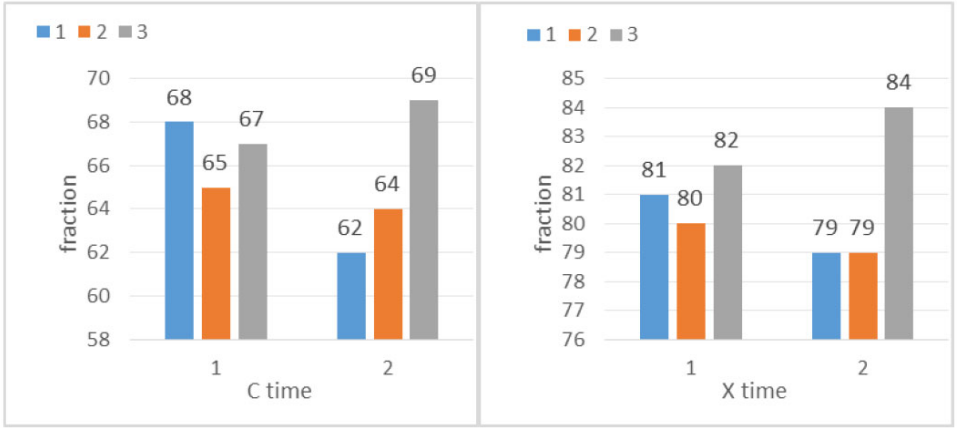
Through comparison, it was found that the degree of freedom of students' body, mind, and study time in the traditional English translation teaching mode was relatively small, generally around 2, which corresponded to less freedom. However, based on the English translation under the mobile learning mode, the degree of freedom of students was relatively improved, and the degree of freedom was around 3.6, which corresponded to general freedom. It had been greatly improved compared with the traditional teaching mode. The learning effect of students under the two modes was also different. Traditional

teaching only provided students with a mechanical instillation of knowledge, and students lacked initiative; while the foundation of mobile learning was based on the active level, so the learning effect was also different. The comparison chart is shown in Figure 6.

Through comparison, it was found that under the traditional English translation teaching mode, students' learning efficiency was relatively low, and after listening to the teacher, they were more forgetful. However, the learning efficiency based on mobile learning had been greatly improved, and the learning effect had increased from 0.43 to about 0.7. Students were more motivated to translate English, and their learning efficiency also increased. In addition, mobile learning could be learned at any time, which was also a great improvement.

To change the learning mode, the main thing is the students' English grades. The comparison of students' English scores in three months is shown in Figure 7.

Figure 7 Performance comparison (see online version for colours)



Through the comparison of English scores in the two modes, it was found that students' English scores in the traditional mode were generally around 64 points; in the case of mobile learning, students' English scores were around 79. The score had increased by about 23%, which also showed that the English translation class based on mobile learning had an effect on the improvement of students' scores. It can be seen from the above that it is very necessary for English translation teaching based on mobile learning.

5 Discussion

This article compares the English translation teaching model based on mobile learning with the traditional teaching model, revealing significant differences in student satisfaction, learning freedom, learning effectiveness, and English grades between the two. Firstly, from the perspective of student satisfaction results, students' choice of teaching methods is not only a response to educational content, but also a feedback on teaching methods and environment. The flexibility and adaptability of mobile learning enable students to better grasp the pace of learning, thereby enhancing their satisfaction. Existing research also suggests that students typically exhibit higher levels of engagement and satisfaction in high degree of freedom learning environments, which is

consistent with our findings. Secondly, in the comparison of learning freedom, the significant improvement in freedom in mobile learning mode not only helps students to learn actively, but also enables them to choose their own learning methods and time during the learning process. This is consistent with some research findings, meeting the current demand for personalised learning among students and to some extent promoting their awareness of self-directed learning. In terms of learning effectiveness, the significant improvement in learning efficiency based on mobile learning mode indicates that mobile learning can not only provide knowledge transmission but also promote deep learning through interaction and participation. Under strict curriculum arrangements and feedback mechanisms, students are able to better master translation skills and apply them to practical scenarios, highlighting the improvement of their English grades.

Although this article reveals multiple advantages of mobile learning in English translation teaching, there are still some limitations. The sample size of the questionnaire survey is relatively small and may not fully represent the experience of a wider population. In addition, the exploration of different types of mobile learning tools and their specific application effects is not yet sufficient. Future research should consider introducing larger sample surveys and exploring in depth the specific application effects and user experiences of different mobile learning technologies in English translation teaching.

6 Conclusions

This article compares the traditional English translation classroom teaching mode with the mobile learning based teaching mode, points out the shortcomings of the traditional mode, and explores the application of mobile learning technology in improving the effectiveness of English translation. Research has found that the English teaching model based on mobile learning significantly improves students' satisfaction, enhances their learning freedom, and improves learning outcomes and grades. However, the limitation of this article is that it fails to comprehensively describe all device technologies based on mobile learning, and the explanation of the teaching system is relatively lacking. Future research should further explore the importance of interdisciplinary collaboration in the development and application of mobile learning, and encourage experts from different fields to participate in research and innovation together. Future research may explore the following directions:

1 developing an AI-based personalised translation learning path recommendation system

2 combining virtual reality (VR) technology to enhance cross-cultural context simulation

3 constructing a multimodal data (such as eye tracking, voice interaction) analysis framework to optimise teaching strategies

4 conducting cross-national comparative studies to verify the cultural adaptability of the model.

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Declarations

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

Informed consent statement

All authors were aware of the publication of the paper and agreed to its publication.

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