



# Mobile Learning Model and Process Optimization in the Era of Fragmentation

Shi-Jun Zhang

Wenzhou Business College, CHINA

Gui-Hua Yu

Wenzhou Business College, CHINA

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## ABSTRACT

In the context of mobile Internet, college students' leisure time has fragmentation characteristics to improve the value of time, it is of great practical significance to make full use of fragmentation time to study effectively. This research focuses on mobile learning model and its effect, firstly, qualitative research is used to construct the mobile learning model and mobile learning mechanism which is different from the traditional teaching mode; Secondly, based on the perspective of "Mobile Internet + Teaching" and a case of "international marketing" course, the author uses the method of questionnaire and single group quasi experiment to test the learning effect. The empirical results show that the mobile learning model can fully mobilize the enthusiasm, initiative and creativity of the students in the mobile learning process and help to improve the quality of learning, efficiency and effectiveness of teaching. Comprehensively utilizing system push, multiple customizations and multiple communication functions of mobile communication platform to reach the orientation of "learn everything you can, everywhere you can", so, take specific course to carry out practice testing, which provides theoretical reference for the relevant curriculum teaching reform.

**Keywords:** mobile Internet, mobile learning, traditional teaching, blending teaching

## INTRODUCTION

College is a pluralistic small society, college students continued to change space from learning space to living space every day, students' time is split into irregular time slice in the intermittent space conversion, that is "fragment time" ( Alrasheedi, M., & Capretz, L.F., 2015). These fragment time has different sizes, it can not make a systematic learning project, but the total amount of fragmented time is relatively very large. How to adapt to the requirements of the mobile international era, taking a full and reasonable use of these fragment time to carry out effective learning and improve the using value of time is a major issue for university teachers and managers.

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**Correspondence:** Shi-Jun Zhang, *Institute of Foreign Language and Foreign Trade, Wenzhou Business College, China. Address to ChaShan Higher Education Park, Wenzhou City, Zhejiang Province, Wenzhou (325035), China. Tel: +86-0577-8659-6813.*

✉ [zsj990901@163.com](mailto:zsj990901@163.com)

### **State of the literature**

- The previous studies on the mobile learning model mainly focused on qualitative research, theoretical research and technical feasibility study, and the interpretation of concept, technical support, etc.
- There is no micro-level research on the mobile learning model, process design, learning method, so there is need the experience-style exploration for the learning effect by a specific learning project.
- This paper explores the construction, use, and test of the mobile learning model, to summarize the application, recognition and learning effect on mobile learning model.

### **Contribution of this paper to the literature**

- Constructing a scientific mobile learning model, mobile learning process and mobile learning control mechanism .
- Adopting mobile learning model can significantly improve learning quality, and it provided empirical support to carry out large-scale mobile learning and teaching.
- Providing also a theoretical basis and operation guarantee for O2O (online and offline) mixed teaching system in the future.

With the development of wireless network technology, a variety of mobile terminal equipments came into being, such as intelligent mobile telephones, flat PAD and others all become more and more popular. Most colleges and universities have achieved full wireless network coverage in the teaching area and dormitory area of the campus, and every college student has a smart phone, a small part of the students have two smart phones, most students have notebook PC in the dormitory, and some students also have ipad, these mobile devices can promote communication, learning as well as discussing (Basurto, X.,2013). At the same time, the application of mobile devices also brings a strong fragmented impact on traditional education and traditional learning methods. Whether there is a feasible learning method that can make a full use of these fragmented time to meet the personalized learning at all times and in all places. So the research proposes a new fragmented "mobile learning model", students put the learning into the fragmented time, and ultimately form a beaded-style learning system, making learning become a spontaneous and self-conscious process.

The researchs on mobile learning model abroad mainly concentrated in more developed mobile communication countries. The concept of mobile learning can be traced back to Wireless Andrew research project that carried out at Carnegie Mellon University of America in 1994, the project mainly tested the application of PDA used in the classroom ( Yujun,L., Shufang,G.,2004). Such as another well-known mobile learning case from Ericsson's mobile learning projects: "the next generation learning", "from e-learning to mobile learning" etc, the former solves the equipment malfunction of applying advanced technology(such as telephone and video communication, etc) to conduct mobile learning, the latter solves all problems about mobile learning by applying mobile multimedia (Han, S., Yalvac, B., Capraro,

M. M. & Capraro, R. M., 2015). The concept of mobile learning really attracted the attention of Chinese scholars in 2000, the Desmond Keegan of international distance teaching expert make a report about from the E-Learning to M-Learning at Shanghai TV University, which has stirred strong repercussions (Mike Sharples., 2000). The first domestic mobile learning monograph ("mobile learning – theory. Status quo .trend") was published in June 2008 (Arpaci, I.,2015). On website of EducationDive, Professor Brian Warmoth mentioned mobile terminals and mobile learning (Li, J.H.,2011). Jiao Jianli's research achievement "micro-course: design, development and application" described the applications of mobile learning (Li ,Y.F., Wang, M.J., Wang, J.J., Xie, W.K., Shen, R.M., 2012). Li Jiahou also stressed the trend that transform from traditional educational technology environment to mobile multimedia technology environment (Zhu,X.W.,2011).

With the fast development of mobile communication technology, mobile learning model has been introduced in colleges and universities, corporate training and a variety of network training schools. Yu Shengquan team suffers Ministry of Education to entrust to construct the mobile learning platform of China Mobile Joint Laboratory (Yu, S.Q., Yang, X.M., Cheng,G.,2009); as well as the E-learning Lab Mobile Learning platform developed by Shen Ruimin team of Shanghai Jiaotong University. The construction of these mobile learning platforms provides practical examples for the national colleges and universities to carry out the application of mobile learning model (Liang, L.M., Cao, Q.Q., Zhang, B.H.,2013).

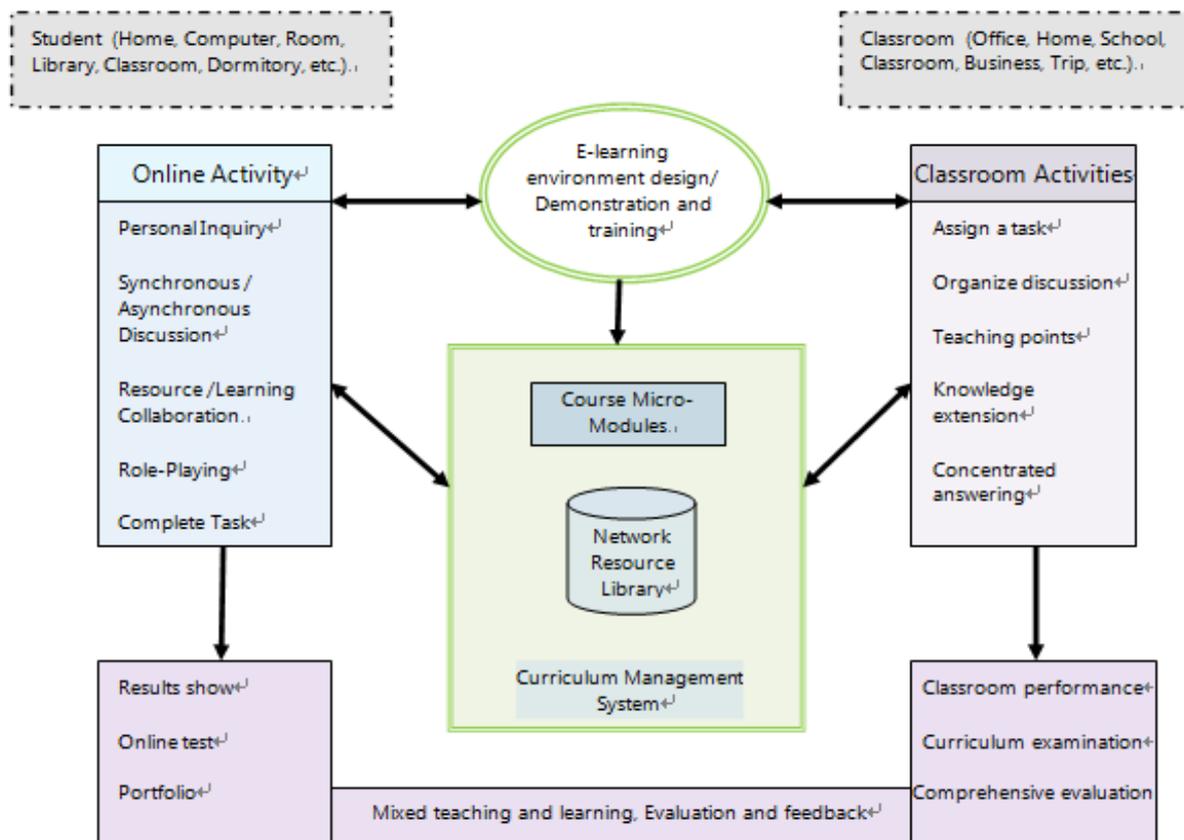
#### THE CONSTRUCTION OF MOBILE LEARNING MODEL AND MECHANISM

The mobile learning model is a way and operating mechanism which enable students to achieve the best learning status. The factors that affect mobile learning model include students characteristics, curriculum teachers, learning situation, learning time, learning style, learning objectives, learning medium, learning content , learning process, learning evaluation, etc., the combination of these factors forms the mobile learning model (Soykan, E. & Uzunboylu, H., 2015).

#### **The Designing of Mobile Learning Model**

The teaching model based on mobile learning includes online activities and classroom activities. The classroom teaching mainly focuses on the guidance of teachers, and online activities mainly focus on students use mobile multimedia to carry out self-study after class according to the teachers' guidance program.

Before the start of mobile learning model, teachers should firstly divide the course into micro chapters or micro-knowledge modules suitable for mobile learning and construct network database, teachers can draft guiding program at any time or place, but discussion activities mainly be performed as an ensemble in the classroom. Through classroom concentrated explanation of the theory knowledge, as well as students' centralized discussion, summary, knowledge extension and centralized Q & A after online self-study. Students' online self-study can look for information on line, discuss in group synchronously or asynchronously,

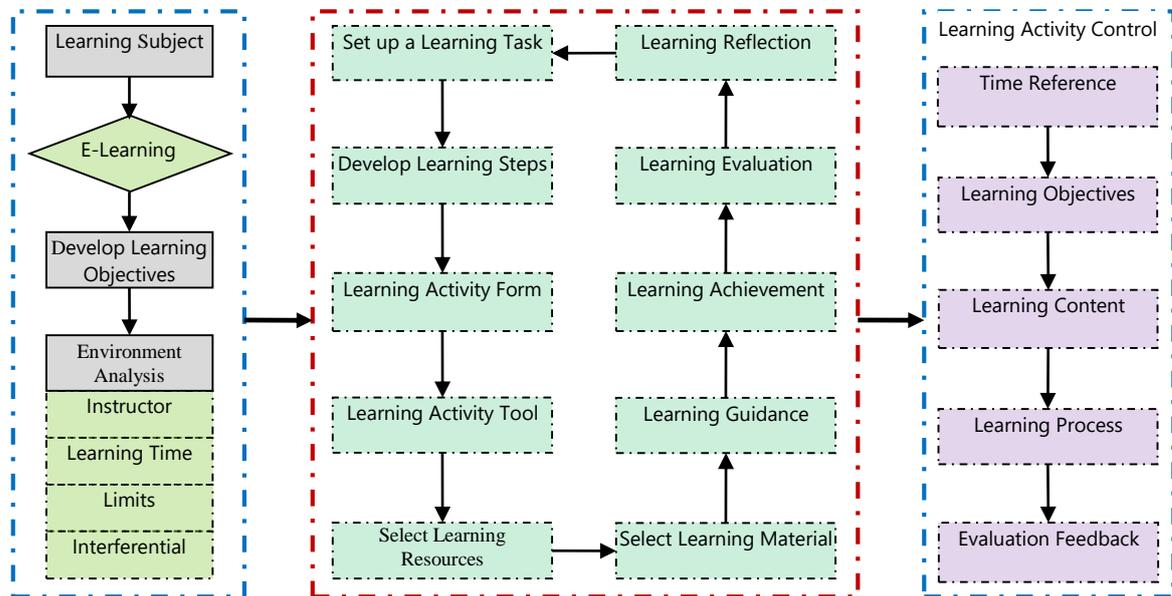


**Figure 1.** Structure Map of Mobile Learning Model

cooperate, collaborate and assign role tasks in groups etc at home, computer room, library, classroom, dormitory, out of school, waiting/sitting in the bus that any places can access on line. After the completion of all courses' micro modules, students can carry out display of achievement, mobile online testing, and collation mobile learning data files and submit them online. Teachers evaluate the performance of the students' online learning and centralized face-to-face learning, and summarize online testing, classroom testing results, and then make a comprehensive evaluation for students' online and offline learning, which as the final effective scores of the course. (Figure 1).

### The Process and Control Mechanism of Mobile Learning

Mobile learning is the tridimensional network resources that allow students access to the course through mobile multimedia terminal at any time and place, and allow students to publish problems in the learning process or evaluate on the mobile terminal, so as to form a learning exchange platform with feedback function(Cochrane, T.D.,2014). This kind of mobile learning mode requires the curriculum resources are the three-dimensional resources so as to obtain the required learning resources.

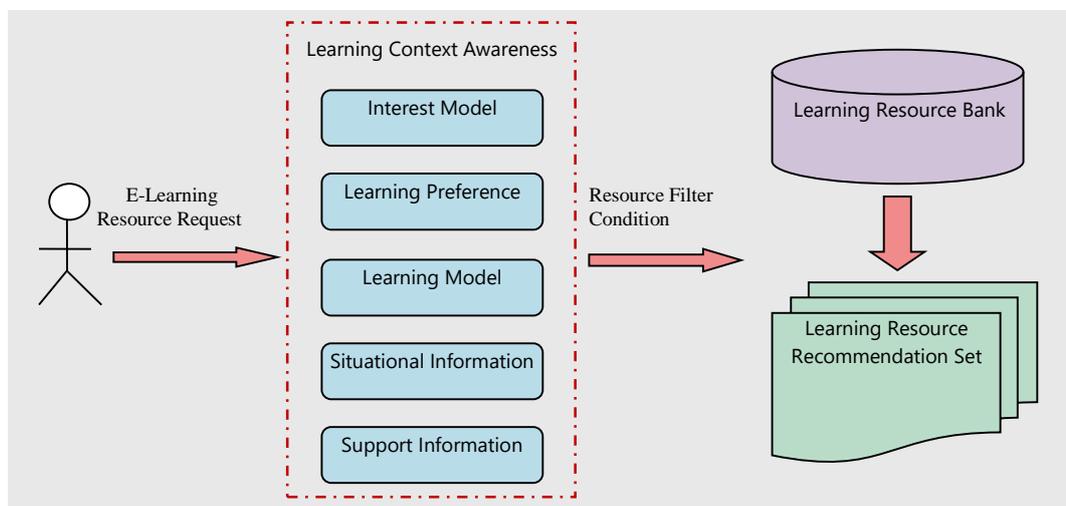


**Figure 2.** Learning process and control mechanisms of mobile learning model

The mobile learning model is based on fragmented time segments, so the learning content must be simple, the goal is easy to be implemented, and it is better to make a short-term and timely learning effect. Learning environment affects the content, learning processes and others of mobile learning, it is need to analyze the learning environment to quickly determine how to implement mobile learning and what to learn, the related learning environment mainly includes learning time, learning interference, conditional restrictions, interactive communication, etc. (see **Figure 2**).

To set up the mobile learning activities as the following steps: set up learning tasks, develop learning steps, select the form of learning (such as browsing the web, watching the video, send out micro blogging, QQ exchange) learning tool configuration (mobile phone, tablet PC, notebook PC), learning resource/materials selection (text, picture, video, PPT), learning guidance (assisted learning, research-based learning, team learning, entertainment learning, etc.) , learning results (notes, opinions, inspiration, reflection, homework), learning evaluation and reflection (learning beans, gift cards, give praise,etc.) (see **Figure 2**).

You can expand resources to suit your needs, the process of the request of mobile learning resource is shown in **Figure 3**. Through drawing up mobile learning rules to effectively control mobile learning activities and ensure that students can truly carry out the activities in predetermined goals and scope of mobile learning, the control mechanism mainly ensures that students can allocate fragmented time reasonably, locate learning target accurately, select learning content accurately, and optimize learning process, as well as effectively feedback, etc.



**Figure 3.** Mobile Learning Resource Request

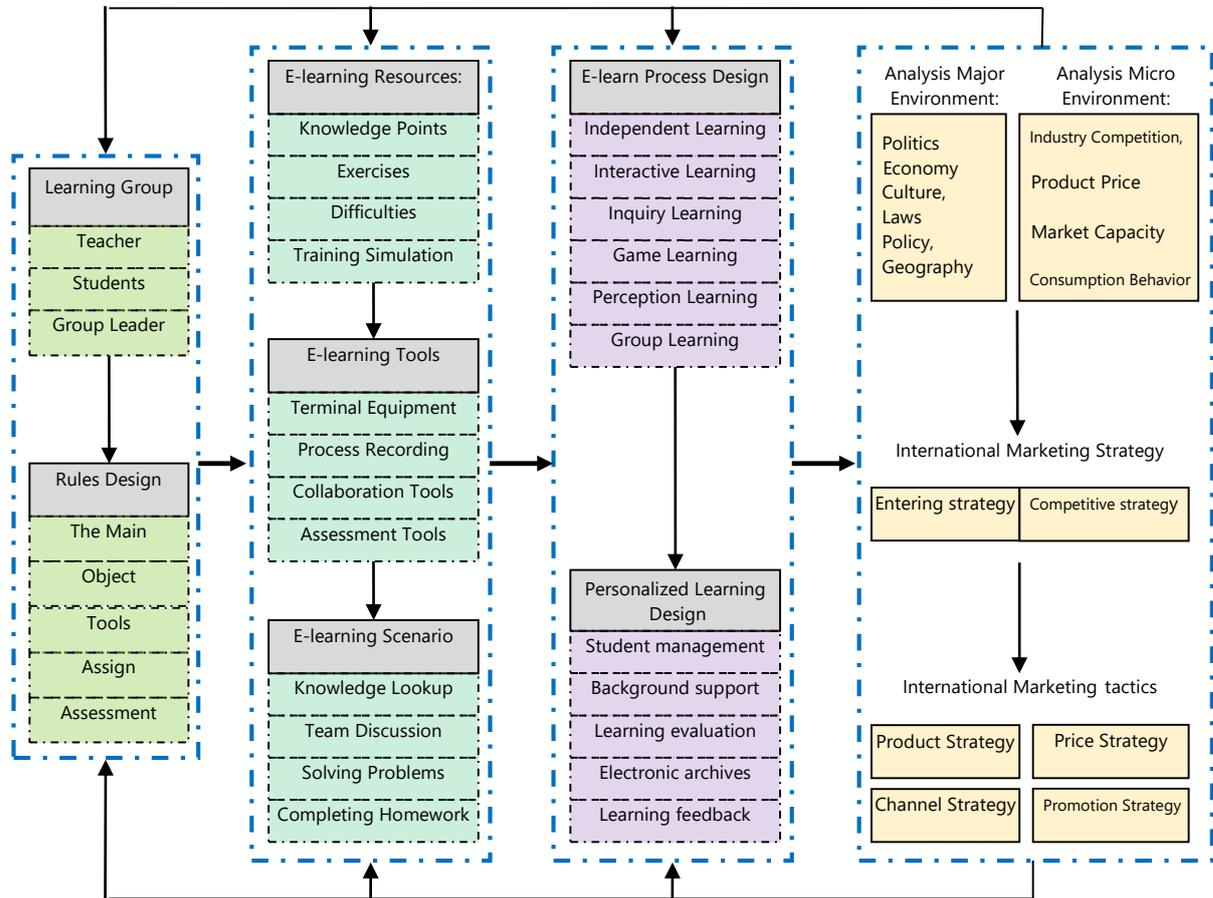
### EVALUATED MEASUREMENTS OF MOBILE LEARNING

Taking "international marketing" as an example, this course is a difficult and practical course. In the teaching of international marketing course, due to limited hours, the course content is large, and much practical knowledge training, so that leads to the classroom actual teaching effect is not ideal. although teachers prepare lessons fully, the lessons is full of chart, text, sound and image, rich teaching content and form, and strengthening the classroom management, but students sometimes still play mobile phone in the lessons, and according to the observation, students all use much leisure time after class for mobile QQ chat, we chat, play games, read news etc, that is wasting a lot of valuable time, so it is an urgent task to develop a practical learning model to compete for fragmented time.

#### **Mobility Learning Factors of International Marketing Course**

The logic of mobile learning of international marketing course is that first analyzes international market, and then describes the microcosmic environment of international market, and constructs international market entry mode and competitive strategy, finally designs international marketing strategy (product strategy, channel strategy, price strategy, promotion strategy). According to the characteristics of mobile learning micro-curriculum, modularizes above logical content to form suitable factors of international marketing mobile learning.

Taking into account students' learning habits, willingness and microcosmic heterogeneity to favor interaction of mobile learning , the learning group is consisted of students, teachers and team leaders. The team leader plays a coordinating role in the activities of the virtual group that organizes members to make regular exchanges, results displays, and organizes virtual competition activities or thematic discussions. The mobile learning platform can provide a variety resources related to international marketing, through creating virtual



**Figure 4.** Mobile Learning Factors of International Marketing

learning situation, adding the entertainment and the sense of game to stimulate students' interest in learning (see **Figure 4**).

Learning activities are a complete organic system that at least contains three core elements: subject, object, and community; three minor elements: tools, rules, and division of labor. The subject of mobile learning activity of international marketing is the students, the object is the learning object, the community refers to the participant who completes the learning process together with the learner, mainly are the students, teachers, organizers; the tool refers to hardware and software used in the mobile learning process (such as intelligent mobile phones, PDA, electronic dictionaries and other mobile terminals, learning software, information publishing tools, information query tools, search tools, etc.); rules refer to an agreement that coordinates students (such as participation rules, task completion rules, evaluation rules, exchange rules, etc.); the division of labor refers to the task of different participants in the learning process (such as teachers do the guidance and design, students participate in learning activities, team leader coordinates the environment) (see **Figure 4**).

The mobile learning resources of international marketing includes knowledge points, examples of exercises, difficult problems and training processes of micro-course, and in any case. Mobile learning tools include terminal equipment, learning process records, interactive collaboration tools, process assessment tools. Mobile learning situations include knowledge search, group discussion, problem solving, and homework completed(see **Figure 4**).

Based on the characteristics of mobile learning environment of international marketing, you can design learning forms such as autonomous learning, interactive learning, inquiry learning, game learning, perception learning, group learning etc. The mobile learning platform provides support of timely study (including support for learning content, learning activities, learning strategies, learning services, and learning path, etc.), and because students' scenarios are in dynamic changes, this requires the backstage push system can be able to push the appropriate curriculum resources to students, that is, taking into account of the characteristics, situation, mobile devices of different learners; carry out learning evaluation, inspire students for reflection, accept students' feedback, and adjust the follow-up processes in the mobile platform; establish students' learning virtual file pack, record students' test scores, interview records, learning feedback, mobile homework and other traces, as the basis for final assessment and evaluation in the mobile platform (see **Figure 4**).

## **The Mobile Learning Effect Testing of International Marketing**

### *Research methods and sample sources*

We believe that the evaluation of the implementation effect of mobile learning model should be based on the improvement of students' cognitive level, students highly agree on the new model of mobile learning, and give enthusiasm, support and cooperation, which reflects the application prospects of mobile learning model. We use questionnaire survey and a single unit quasi-experiment to test the students' cognitive level, a sample of 197 students drawn from 4 classes that participate in the mobile learning model of "international marketing" course, In addition to 6 students that can not participate in the questionnaire, 191 questionnaires were collected, the invalid 5 questionnaires were removed, finally, there are 186 valid questionnaires, so the questionnaire efficiency was 97.4%.

### *Variable setting and research hypothesis*

The purpose of this research is to test the learning effect under the mobile learning model. Therefore, we take mobile learning model as the independent variable and take learning effect as the dependent variable, and at the same time taking the "gender, scores of school entrance, origin of student(rural, urban), profession, family status, parental career "as the control variables. The study assumes that reasonably use the mobile learning model can significantly improve learning effect, turning the pure entertainment tool of mobile phone into learning tool, students can allocate time resources reasonably, optimize the learning process, enhance the overall quality of learning.

**Table 1.** The Feedback of Mobile Learning Effect

	<b>Totally not agree</b>	<b>Basically not agree</b>	<b>General</b>	<b>Basically agree</b>	<b>Totally agree</b>
The enhancing effect of mobile learning act on international marketing	0 (0%)	1 (0.53%)	21 (11.2%)	112 (59.6%)	54 (28.7%)
I will spend more time on the course of mobile learning	0 (0%)	5 (2.65%)	17 (9.1%)	98 (52.1%)	68 (36.2%)
Actively participate in the tasks of mobile courses learning	0 (0%)	0 (0%)	4 (2.1%)	134 (71.3%)	50 (26.6%)
Mobile learning is more interesting than traditional teaching	0 (0%)	0 (0%)	11 (5.85%)	88 (46.8%)	89 (47.3%)
The easier interchange between teachers and students, and between students and students, the higher degree of problem solved	0 (0%)	3 (1.60%)	6 (3.2%)	91 (48.4%)	88 (46.8%)
Individuals have more autonomy learning and choosing opportunities	0 (0%)	0 (0%)	14 (7.44%)	107 (56.9%)	67 (35.6%)

### *Survey questionnaire design*

The questionnaire involves 4 first level indicators, which respectively are "knowledge", "skill", "learning process and method", "attitude and values", 16 second level indicators, design options" totally agree ", " basic approval ", " general ", " basically do not agree ", " totally not agree", a total of five levels of vector. The "4PS" (Product,Channel,Price, Promotion,Service) section was selected in the international marketing course under using the mobile learning model, and using the questionnaire to conduct the "F test" to evaluate the learning effect. And designed another test to measure the quality of mobile learning, the fore-test is to teach and learn "4PS" by the traditional classroom teaching in the non-mobile learning model, the fore-test contains five major questions and 20 small questions. The post-test is that the teacher carry out new teaching model for the "4PS" module in the mobile learning model, after class, students use mobile multimedia to carry out personalized learning, entertainment learning, explored learning, collaborative learning and other methods. In order to maintain the unity before and after comparison, the post-test also contains 5 major questions and 20 small questions. After implementing two teaching modes, the fore-test of the traditional teaching mode and the post-test of the mobile learning model was used to carry out, and use SPSS 21.0 to conduct t-test for fore-test scores and post-test scores to evaluate the learning quality in the mobile learning model.

### *Student questionnaire feedback*

As can be seen from **Table 1**, students basically agree that international marketing courses adopts the pattern and role of mobile learning (88.3%), which also proves that the application of mobile learning model in international marketing courses is successful to some extent; 88% students said they would spend more time on mobile learning, this may be due to the fact that students spend very long time on mobile devices, they have enough time to browse the mobile learning platform; even up to 97.9% students said they would complete the course of mobile learning tasks; 94% students agree that mobile learning model is more

**Table 2.** Validity Check of International Marketing "4PS"

Item	Variable Description	Score Rate Fi
Knowledge	●Master the basic concepts, ideology, principles, strategies and other theoretical knowledge of 4PS	0.81
	●Be familiar with the strategy principles of overall concept of product, the life cycle theory of international product, product mix, new product development, brand, packaging and others.	0.80
	●Be familiar with the main factors affecting the pricing, master the basic pricing methods	0.84
	●Master the distribution channel pattern for small and medium enterprises	0.87
	●Master the way SMEs enter into the international market	0.83
	●Seize the ideas of the promotion mix strategy, personnel selling, promotional process control	0.80
	●Learn to analyze what should be of the development trend of distribution channels	0.88
Skills (Capability)	●Self-simulate and design, produce, name, packaging design and others for the selected products	0.86
	●Distinguish the length, breadth, depth, relevance of the product mix	0.89
	●Learn to apply the pricing techniques and variable pricing strategy	0.81
	●Give a full play to provide pricing basis for an product, so as to get the specific price of product	0.87
	●Visit the target market enterprises to learn their channel selection, operation, management status	0.83
	●Make an product promotion for selected products	0.85
	●Design the classroom as simulated market, and respectively use the identity of the marketing staff and the identity of customer to simulate the transaction	0.82
	●Ask questions based on channel status and channel selection of the visited enterprises	0.80
	●Use mobile network tools to design promotional mix program for a product of market introduction	0.84
	●Combine with knowledge and skills to improve the ability to analyze and solve problems	0.88
Learning Process Methods)	●Use mobile tools to conduct international market research and collect market information	0.86
	●Use mobile multimedia tools to learn development process of new product	0.89
	●Use mobile multimedia to price a given product scientifically	0.85
	●Establish a marketing career awareness, analyze questions from perspective of corporate marketing	0.83
Attitude and Values	●Takes active interest in mobile learning model, so as to form a proactive mobile learning awareness	0.84
	●Form teamwork cooperation awareness, and enhance team cooperation ability	0.81
	●Enhance the attitude, comprehensive performance, ability, awareness of innovation	0.80

interesting; 92.5% students believe that they will get more opportunities through mobile learning platform. This means reach to the expected setting goal of mobile learning.

### RESULTS AND DISCUSSION

Adopting the questionnaire to evaluate the "knowledge", "skills", "learning process and methods", " attitude and values "of "4PS" module of the international marketing course, the evaluation results of each module is shown in **Table 2**.

It is obvious that the students who are surveyed get more than 0.8 scores of "knowledge", "skills and ability", "learning process and method", "attitude and value", significantly higher than the statistical standards of 0.5, therefore, the test results confirmed the proposed hypothesis that in the background of fragmented era, students can significantly improve learning habits, can reasonably use time resource, optimize the learning process, improve the mastery of knowledge, and then master the operational skills and practical ability to enhance the overall quality of learning through mobile learning model. The mobile learning effect is verified by empirical test.

At the same time, in order to detect the students' learning quality through mobile learning, we use the SPSS 21.0 statistical software to carry out T test for the fore-test scores of traditional teaching model and the post-test scores of mobile learning model to measure the learning quality, the results are shown in **Table 3**.

**Table 3.** T-test Results of Fore-test and Post-test

		Differential Twin				t	df	Sig. (both sides)
		Average	Standard Deviation	Standard Deviation of Average	Difference of 95% Confidence Interval Lower limit      Upper limit			
Twin 1	Fore-test Post-test	-6.107	3.749	.571	-7.826      -4.951	-10.934	188	.000

It is obvious from observing the paired samples and test results that t difference statistical probability P is less than 0.05, indicates the obvious difference between fore-test scores and post-test scores, there is a great effect that this course conduct mobile learning model, the difference of mean average score of fore-test scores and post-test scores is equal to -6.107, that is the average score of post-test scores is higher than the average score of fore-test scores, t value is -10.934(p=0), indicating that through mobile learning model, students learn international marketing "4PS" section better than through the traditional teaching model. Therefore, study result shows that adopting mobile learning model for teaching and learning in the background of fragmented era can significantly improve the learning quality, and provides empirical support to carry out large-scale mobile teaching model in the future.

### CONCLUSION AND RECOMMENDATION

The mobile learning in the background of fragmentation is a new learning model, this model can meet maximal requirements of personalized learning at any time, anywhere, and as well as can promote study happily. This study constructs the structure of mobile learning model that is suitable for the fragmented era. Takes the international marketing course as an example to design the micro-course resources of mobile learning and plan the students' mobile learning process. Adopts single quasi - experiment to evaluate the effect of mobile learning model. At the same time, using the pre-test of traditional teaching model and post-test of mobile learning model, to evaluate the students' learning quality in the mobile learning model. The results confirm the research hypothesis that through the mobile learning model, students can significantly improve their learning habits, students can optimize the learning process, improve the mastery of knowledge, operational skills and practical ability and enhance the overall learning quality. The result provides empirical support to carry out large-scale mobile teaching model in the future. The socialization, mobileization, timeliness, fragmentation and individualization are typical features of mobile learning model. It is necessary to fully understand these characteristics and teaching ideology that can provide college students with more personalized learning experience, a few suggestions for this:

- To change teaching ideology, reform teaching model. Mobile phones, PDA and other equipments have entered students' life, decentralizes students' learning attention, strikes traditional classroom teaching. It is urgent to renew teaching ideas and teaching mode to meet the students' interests in mobile devices, thus construct mobile learning model and mobile learning mechanism.

- To develop mobile learning resources. Construct a professional curriculum mobile learning platform, and use mobile learning hardware and software to develop mobile learning resources. Mobile learning resources focus on the characteristics of micro-courses and students' interesting with scene simulation, graphic animation, game video, etc. to meet students' personalized learning in the mobile internet Era.
- To strengthen the operational capacity of information technology. Teachers should master some mobile learning application softwares, masterly search teaching resources and develop mobile learning resources by software tools, learn to operate mobile interactive platform and other multimedia application.

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