Research on Learning Resource Design Model Based on Mobile Learning

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Abstract. The mobile learning resource is the basis of mobile learning, and its quality may directly affect the effectiveness of mobile learning. At present, the domestic mobile learning resources are characterized by lack of quantity, mostly lingual contents and simple content structure, and some of the resources have become direct relocation of network learning resources, so it is hard for them to meet the real demands of mobile learners. Therefore, the research on design and development of high-quality mobile learning resources suitable for learners is of great significance to the popularization and promotion of mobile learning. Based on customer needs, the Customer Value Theory maximizes the business competitiveness and value while enhancing the customer satisfaction and loyalty. In the implementation process of mobile education, learners are not only the object of education, but also the customers who enjoy educational services. In this study, the Customer Value Theory is introduced to the design of mobile learning resources, orientation is taken for learners, and the mobile learning resources that meet the needs of learners are designed and developed. It has been proved that the design of mobile value products based on customer value can effectively meet the needs of mobile learning.

Keywords: Mobile learning · Customer value · Learning resources

1 Introduction

The mobile learning resources are a carrier for learners to implement mobile learning. To effectively promote the rapid development and popularization of mobile learning, attention should be paid to the research on mobile learning resources. Due to the late development of mobile learning in China [1], the research on mobile learning resources lacks comprehensiveness and depth, as well as mature design principles and development models for theoretical guidance, resulting in scarce resources, low quality and failure in satisfying the mobile learners' updated learning needs. As a result, in order to promote the development of mobile learning, the researchers should lay more emphasis on the development of mobile learning resources to form high-quality mobile learning resources and further improve the learning performance of mobile learners [2, 3]. By

absorbing the concept of customer-oriented in the commercial field, this paper focuses on the field of mobile education, carries out research on mobile value based on customer value, develops and designs mobile learning resources suitable for learners, and meet the learners' learning needs, hoping to further boost China's mobile educational development. In the meantime, this paper introduces the Customer Value Theory into the design of mobile learning resources. Through the customer value hierarchy model, the customer value formation of mobile learners can be understood, which can effectively understand the learning needs of learners, truly achieve learner-orientation [4, 5]. Also, the design principles of mobile learning resources are developed and improved, and the mobile learning resource design and development model is built based on customer value, playing a positive role in guiding the design and construction of mobile learning resources.

2   Related Concepts

2.1   Mobile Learning Theory

Based on distance education, Chabra et al. defined it broadly [6]: Mobile learning was the ability to use any device and learn at any time or at any place. Combined with D-Learning and E-Learning, Georgiev et al. argued that M-Learning was a new stage of development in D-Learning and E-Learning [7], and it was a special existence form. From a technical point of view, Alexzander Dye et al. defined mobile learning as follows: Mobile learning was a type of learning that could be performed at any time or at any place, with the help of a mobile computing device, the mobile computing device used in mobile learning must be able to effectively display learning contents and provide two-way communication between teachers and learners [8, 9].

2.2   Mobile Learning Resource

It refers to anything that helps individuals learn and operate in an effective manner. The mobile learning resource falls into the category of learning resource. According to its own characteristics, the mobile learning resource can be defined as various information resources that learners learn through mobile terminal under the mobile learning environment. Due to the late development of mobile learning and imperfect theoretical system, unsound resource construction principles and models, it draws on the network learning resources from many aspects.

2.3   Customer Value

With the gradual development of market economy, the customer value has begun to attract the attention of Western marketing scholars and entrepreneurs. The creation of customer value can meet customer needs and improve customer satisfaction and loyalty, thereby maximizing business value while enhancing the business competitiveness. PilipKeteler's delivered Customer Value Theory illustrated customer value from customer satisfaction and the customer delivered value, which were visually expressed as

Customer Value = Total Customer Values - Total Customer Cost, i.e., the difference between benefits that a customer obtains through a product (or service) and the cost of purchasing this product (or service). The greater the difference is, the greater the value pursued by the customer is and the greater the customer satisfaction obtains. The model map is shown in Fig. 1.
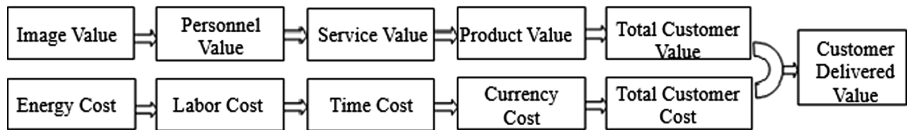

Fig. 1. Customer delivered value model

2.4 Mobile Learning's Customer Value

Under the background of mobile education, great changes have taken place in the mobile education as compared with the traditional education. Therefore, it is unfeasible to implement mobile learning by the traditional educational method. The place for mobile education provides mobile learners with the appropriate mobile learning products and mobile learning services. The mobile learning's customer value stands for a subjective feeling formed while the mobile learning customers are using mobile learning products to enjoy mobile learning services, as well as the senses of gain and loss and the subjective judgment and evaluation on the difference between ideals and reality after the end of mobile learning.

3 Analysis of Learning Resource Needs in the Mobile Learning Environment

The learning needs analysis is a systematic process of investigation and analysis. The results got by collecting and analyzing the results of the questionnaire may objectively demonstrate the learning needs and preferences, providing a prerequisite for the design and development of mobile learning resources. Based on the relevant questionnaires and the above analysis, the author mainly investigates the mobile learners' current application situations of mobile learning resources, learners' preferences and needs, and attitudes towards mobile learning. The survey respondents were undergraduates from Heilongjiang International University, and covered normal freshmen, sophomore and junior students majoring in literal art and science, including 200 female students and 35 male students. A total of 235 questionnaires were issued, 230 were recovered, of which 220 were valid questionnaires, with the effective rate of 96.7%. A total of 17 questions were raised in this questionnaire. Besides, the questionnaire mainly consisted of four parts, with the contents as shown in Table 1.

Table 1. Questionnaire setting

Composition	Dimension	Segmented contents in dimension	Number of questions
Part I	Basic information	Grade, major and gender	1
Part II	Current situations of mobile learning	Selection of mobile learning device, mobile learning time, hindering factors and concentration distractions	4
Part III	Mobile learners' preference over product attributes	Product contents: type of required contents, presentation method, learning method, time spent in learning content complexity of the contents taught, and the solution to learning difficulties	6
		Product services: effective learning interaction, personalized services, interface rendering and resource operations	4
Part IV	Attitudes toward mobile learning's prospects	Development trend and the difference with traditional learning	2

4 Design of Mobile Learning Resources Under the Guidance of Customer Value Theory

4.1 Establishment of Mobile Learning's Customer Value Model

Professor Woodruff's definition of customer value has received wide support and recognition from academia. Customers choose and buy products based on the product efficacy, the attributes of the services, and the likelihood of expected realizable value. Based on the analysis of customer value, the author built the customer value hierarchy model for mobile learning, and knew about the expected learning goals and learning outcomes, the expectations and preferences for mobile learning resources and related mobile services through an in-depth survey of mobile learners. Afterwards, the customer value hierarchy theory was applied to mobile learning, and the mobile learning's customer value hierarchy model was analyzed from the aspects of mobile learners' learning motivation, preferences and psychological needs, as shown in Fig. 2.

In this study, the customer value hierarchy model is applied to mobile learning resources. For different types of learning content, the mobile learning customers' expected goals and learning outcomes when conducting mobile learning should be understood in a profound way. Based on this, the author helps learners to narrow the difference between expected value and actual value to a certain extent, increase customer satisfaction and loyalty, and further enhance the value of mobile learning customers.
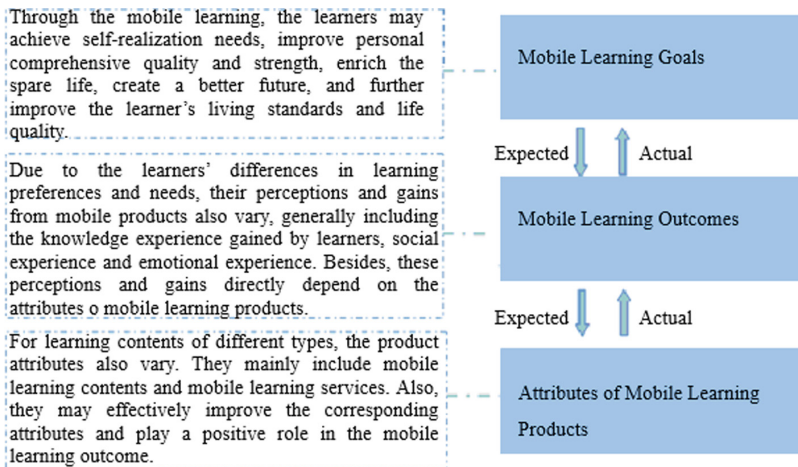
Through the mobile learning, the learners may achieve self-realization needs, improve personal comprehensive quality and strength, enrich the spare life, create a better future, and further improve the learner's living standards and life quality.

Mobile Learning Goals

Expected ↓ ↑ Actual

Due to the learners' differences in learning preferences and needs, their perceptions and gains from mobile products also vary, generally including the knowledge experience gained by learners, social experience and emotional experience. Besides, these perceptions and gains directly depend on the attributes o mobile learning products.

Mobile Learning Outcomes

Expected ↓ ↑ Actual

For learning contents of different types, the product attributes also vary. They mainly include mobile learning contents and mobile learning services. Also, they may effectively improve the corresponding attributes and play a positive role in the mobile learning outcome.

Attributes of Mobile Learning Products

Fig. 2. Mobile learning's customer value hierarchy model

4.2 Establishment of the Design and Development Model for Customer Value's Mobile Learning Resources

For the design and development of mobile learning resources, Professor Huang Ronghuai proposed a macro process model, as shown in Fig. 3.
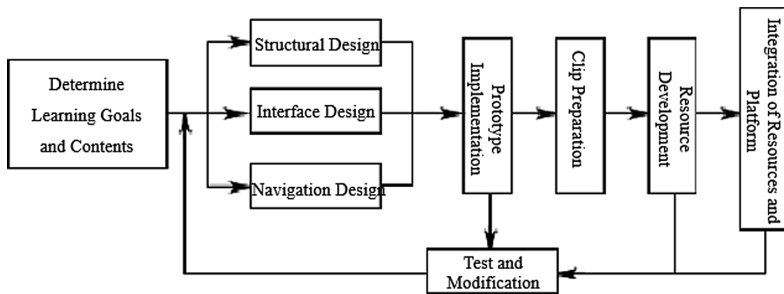
Determine Learning Goals and Contents → Structural Design / Interface Design / Navigation Design → Prototype Implementation → Clip Preparation → Resource Development → Integration of Resources and Platform

Test and Modification

Fig. 3. Design and development process of mobile learning resources

According to the characteristics of mobile learning resources, combined with mobile learning's customer value hierarchy model and development principles, together with the model shown in Fig. 3, this paper takes the learners as orientation and builds the mobile learning resource design and development model based on the Customer Value Theory, as shown in Fig. 4. The model is mainly divided into four modules: preliminary analysis, resource design, development & integration, and testing evaluation feedback.
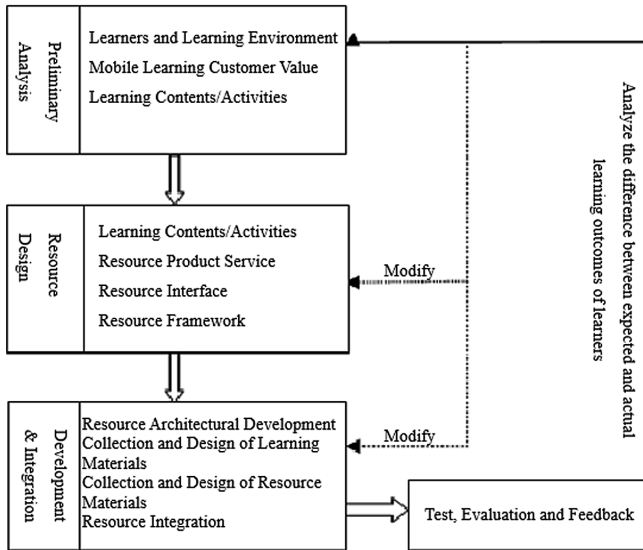
Fig. 4. Mobile learning resource design and development model based on the customer value theory

Preliminary Analysis

Preliminary analysis is the foundation for all product designs, and the mobile learning resources are not an exception. For preliminary analysis of Professor Huang Ronghuai's mobile learning resource development process, it includes the analysis of learning contents and learning goals. The resource products are oriented to mobile learning customers, so the author believes that preliminary analysis should include analysis of mobile learning's customer value, learners, mobile learning environment, and learning contents and activities.

Mobile Learning's Customer Value: It can be concluded from the above mobile learning customer value hierarchy model that the mobile learning's customer value includes the learning goal layer, the learning outcome layer, and the attribute layer. The mobile learners have different expected learning outcomes and goals for different kinds of learning contents, and the learners have expected values of the language and arguable resources, so the learners' expected learning goals and learning outcomes should be analyzed according to the corresponding learning contents, in order to form an in-depth understanding of the learners' learning needs and preferences, design the attribute of resource products, and enhance the learning effectiveness of mobile learning resources. Learners Analysis: Comprehensive analysis made on the learners' personality traits, learning psychology, learning backgrounds and learning styles. After a full understanding of learners, the designer will conduct effective analysis and design of the learning contents and learning activities from the perspective of learning contents.

Analysis of Mobile Learning Environment: The mobile learning environment is the foundation of mobile learning activities. Due to the flexible mobile learning time and

space, the mobile learning environment is relatively random. Therefore, the mobile learning resource designers should fully consider the mobile learning environment when developing resources, such as mobile terminals and network environments. Analysis on Learning Contents and Activities: There are different types of learning contents, such as verbal learning, professional knowledge learning and certification exams. The appropriate learning activities should be designed according to different learning contents, so that they may be suitable for media organization, content presentation and granularity division.

Resource Design

Design of Learning Contents and Activities: The design of learning contents and activities is the core of resource design. Based on the above analysis of learners, learning environment and mobile learning customer value, the author sets the appropriate presentation and organization according to the type of learning contents, and then design appropriate learning activities according to the type of learning contents. For example, the language resources are mainly for the exercises of listening comprehension and reading skills. As a result, the design of learning activities should focus on setting listening comprehension exercises and the corresponding tests, whereas the design of certification test resource products should pay attention to learning activities that increase the exercise test based on the appropriate contents.

Development and Integration

Based on the above analysis and design, the resource development & integration are carried out. First of all, according to the above analysis and design, the author builds the resource framework module interface and other contents, and collects, organizes and designs the material resource framework according to the overall framework of resources, such as navigation icons, background images and resource interface map. Afterwards, the author analyzes and designs according to learning contents and activities, designs the corresponding mobile learning resource content materials, and integrates the resource framework materials with the resource content materials and framework to form the complete mobile learning resource products.

Test, Evaluation and Feedback

In the development process, the development tool's simulator can be used for stage testing, or can be imported to the smart mobile device for physical testing. After the initial resource development, through the use experience of the research object, the resource design developer may collect the evaluation feedback data of the research object and analyze the learners' actual learning effects. Afterwards, the designer may compare the learners' learning goals with learning outcomes at the beginning of their learning activities, find out the satisfaction gap, and then re-optimize the analysis and design process of resources according to the analysis results. In this way, the learners' learning effects can be further optimized to further narrow the satisfaction gap, enhance its perception of resource products, finally enhance the value of learners, and improve the quality and services of resource products.

5 Case Application of Mobile Learning Resources Based on Customer Value

5.1 Preliminary Analysis of Mobile Learning Resource Case

The preliminary analysis of this case is mainly made from the corresponding aspects of customer value, learners, learning contents, learning environment and learning activities, further paving the way for the following development and design.

Customer Value Analysis Based on the COREL Learning Contents
In preparation for learning COREL, the learners hold the expected goals and outcomes. The design of resource case should meet the expectations of learners on the resource case to enhance learners' perception and evaluation of resource products, thereby enhancing learners' satisfaction and utilization over resource products. COREL belongs to the operative professional knowledge learning. After an interview with students majoring in educational technology, the learners' expected learning objective is to increase learning skills, and add bright spots for future employment; the learners' expected learning outcome is to grasp COREL video production operation and process through the case resources, and produce complete videos after learning and practice.

Analysis of Learners, Learning Contents, Learning Environment and Learning Activities
Through effective preliminary analysis, the resource design is guided, and the corresponding analysis is shown in Table 2.

Table 2. Analysis of learners, learning environment, learning contents and learning activities

Analysis of learners	The research group is oriented to undergraduates. They have higher degrees of freedom
	Plenty of after-school hours, good independent learning, strong self-learning skills, and proficiency in the use of mobile terminals. Therefore, the learning contents should be designed as comprehensive and hierarchical as possible with simple interface operation, and the interaction with learning partners should be appropriately increased
Analysis of mobile learning environment	This is for students majoring in education technology at Liaoning Normal University. The school has a rich extracurricular learning environment and most of the campus is covered by wireless networks. Therefore, the learners can enjoy mobile learning freely after school without the restriction of network traffic and speed, which creates a good condition for the development of mobile learning
Analysis of learning contents	COREL belongs to an operational exercise with strong practicality, vivid learning contents, and small link between the various functional operations. Besides, it can bring learner

(*continued*)

Table 2. (*continued*)

Analysis of learners	The research group is oriented to undergraduates. They have higher degrees of freedom
	sense of accomplishment, which is ideal for mobile fragmented learning
Analysis of learning activities	Learning process is divided into before-class, in-class and after-class processes. The schools provide learners with the corresponding course profiles, so that in-class learners can watch learning resource video, discuss learning problems with partners and share learning experience; the after-class students will obtain the corresponding test exercises to deepen the learning impressions, and the learning resource evaluation function will be provided for learners

5.2 Case Design of Mobile Learning Resources

In the case design, the service design learning contents, learning activities and resource products as well as the module design of resource case are mainly conducted, and the resource development and application are implemented based on the effective design.

Design of Learning Contents and Learning Activities

Design of learning contents

The learning theme is COREL. There are six learning units: getting video clips, adding transition effects and filtering effects, adding titles and captions, adjusting audio clips, and export movie files. The contents are mainly presented in the form of video. In the design of video contents, the author will start with a case study to illustrate the production process of the case, help learners sort out the learning tasks of the corresponding learning contents, and carry out resource content learning along the main line of the learning task. Besides, the author will add text and PPT about COREL learning so as to deepen the learning contents. Learners can also study by online query and offline downloading.

Design of learning activities

Based on the preliminary analysis and content design, the learning activities of this case design mainly include three aspects: video watching& learning, exchange and discussion with learning partners, and after-class testing.

Design of Resource Product Services

In terms of resource product services, there are four modules - learning favorites, learning download, learning record and learning experience - to provide personalized services for learners, so as to enhance learners' perception of using resources and increase customer value of mobile learning. The favorites function can help learners effectively record the appreciative and valuable learning resources; the offline download function helps learners continue the fragmentation learning in the absence of network connection; the learning record function may effectively remind learners of the learning progress; finally the learners may record their own learning experience through the

learning experience module. In such a way, the design can truly achieve learner orientation, enrich the learners' learning experience, and improve their learning outcome.

6   Conclusion

With the rapid development of the information era and the quick changes in the information knowledge, the emergence of mobile learning has enriched and changed the learning method and promoted the construction of lifelong learning community. In this study, the Customer Value Theory is introduced to the field of mobile education, and the design concept and mode of mobile learning resource products are innovated, satisfying the learning needs and preferences to the maximum degree. The conclusions of this study are as follows: The questionnaire survey is adopted over students majoring in education from Heilongjiang International University, in order to make an in-depth analysis of the mobile learners' current learning situation, and know about their needs and preferences for mobile learning resources as well as the learners' attitudes toward the mobile learning development. This has laid a solid foundation for the study. Based on the analysis of customer value concept and model by different scholars, this paper summarizes the meaning of mobile learning customer value, and builds the mobile learning customer value model on this basis. According to the survey results and the mobile learning customer value model, this paper also puts forward the design and development of mobile learning resource design and development principles based on customer value, builds the mobile learning resource design and development model by combining with Woodruff's customer value hierarchy model, in order to guide the case development of the corresponding resource products.

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