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Quality Function Deployment to Combine With Service Design to Optimize the English Vocabulary Learning App's Usage Experience

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ABSTRACT

As mobile technology develops, more people are using their smartphones to learn English vocabulary, and smartphone apps can improve English vocabulary learning effectiveness. When evaluating how to use an app, the process and user experience are equally as crucial as the actual product. Research has also revealed that using applications is not straightforward and that the user interface is not sufficiently clear. Service design, which aims to generate creative service processes, is focused on inter-departmental teams developing procedures based on the needs of learners. Quality Function Deployment is an effective technique for transforming customer requests into product design specifications through a multi-level examination of the product. This study combines a User Journey Map with the Quality Function Deployment to more precisely identify and fix issues with the use of English vocabulary learning applications. The user's thoughts and feelings are expressed in a timeline through the visualization of the use process, user demands are assessed in a hierarchical manner, and important design aspects in the use process are recognized. This is a novel technique to meet fresh learning opportunities and offer fresh viewpoints on the interface's user flow.

Keywords: Quality function deployment, User journey map, User experience, English learning

INTRODUCTION

The development of technology continues to change our learning life, and the popularity of digitalization has led to a gradual shift to Mobile Learning(ML) (Hao, Lee, Chen, & Sim, 2019). ML is the use of mobile devices to learn at any time and in any context (Zhang & Zuo, 2019). ML is gradually expanding into our lives (Chen & Chung, 2008). The use of mobile technology in education has increased, especially in English language education (Ramos Acosta, Guzmán, Rivera, & Bustillo, 2017). WU's (2015) research is effective by installing apps on mobile devices and using them for English language learning (Wu, 2015). Vocabulary is the foundation for learning a language well (Hong, Hwang, Tai, & Chen, 2014), and most language learners will start

with vocabulary. While mobile learning is convenient, there are some problems with it, such as low learning outcomes, short-term memory of learned vocabulary, and other applications that distract the learner (Klimova, 2019).

Therefore, the purpose of this study is to use Quality Function Development (QFD) as a tool for product optimization and upgrade, and combine it with User Journey Map (UJM) to present the interaction and experience process of users learning English vocabulary learning apps in different stages in a visual way, so that each stage can be evaluated and improved.

RELATED WORKS

English Language Learning

As a medium of information transmission, English is an integral part of learning and life (Chen & Chung, 2008). Of the 2.5 billion English speakers in the world, only 400 million were born in an English-speaking country (EF English Proficiency Index, 2021, p. 4).

The EF English Proficiency Index (EF EPI) is an annual report published by EF Education that ranks the English language proficiency and mastery of each participating non-native-speaking country in the world based on the average English proficiency of adults around the world. The latest version of the 11th edition of the report shows that 2 million people, with a median age of around 26 years, participated in the English proficiency assessment, covering 112 countries and territories (EF English Proficiency Index, 2021, p10). According to the Top Ranked IOS App Store Apps by Appfigures, a mobile developer reporting platform, English learning-related apps make up a large portion of the free app downloads in the education category and are ranked relatively high in Grossing (Appfigures, 2023). This indicates that the demand for apps for English language learning is increasing.

Development and Behavior of Mobile Learning

The development of mobile technology provides a lot of convenience for language learning. The media tools used to develop language learning using mobile technology include computers, multimedia phones, audio players, etc., among which mobile devices are the most convenient tools (Chinnery, 2006). It is common for university students in developed countries to own mobile devices (Klimova, 2019). Mobile devices include smartphones, tablets, and wearable devices, among others. Learning with mobile devices is Mobile Learning (ML), and it is the future trend (Zou & Li, 2015). With the popularity of the Internet, the behavior of ML has changed. Before the Internet became widespread, teachers sent language learning content to students' cell phones via text messages, and students received the text messages and engaged in learning behavior that became mobile learning (Kennedy & Levy, 2008). After the Internet became widespread, watching instructional videos, listening to learning-related audio, or reading e-books on the Internet became ML (Kukulska-Hulme, 2016).

METHODOLOGY

This study will use the UJM and the QFD. The UJM and unstructured interviews will be used to understand the user requirements for the English vocabulary learning app, and the user requirements for each stage will be organized according to the stages of the UJM, and then the QFD team will transform the design elements, evaluate the relationship matrix, and weight the total score of the design elements to propose optimization strategies for the English vocabulary learning app.

User Journey Map

The UJM is a visual representation of a user's experience when interacting with a product or service in stages so that each moment of the journey can be individually evaluated and improved (Bruce Hanington, 2012, p95), and its mapping includes Touch Point, Stage, Think, Purpose and Emotional Journey. In Moretti's (2021) study, an application was used to explore the user experience using different UJM to understand user usability (Moretti, Baum, Wustmans, & Bröring, 2021). In this study, four interviewees were invited to draw the UJM. The interviewees will draw the above four sections using their usual English vocabulary learning apps to understand the problems and emotions of the users at each stage of the process.

Quality Function Development

QFD is a quality engineering tool that translates customer requirements into product design requirements, component characteristics, process requirements, and production requirements through multi-level interpretation and analysis, and is used to guide the robust design and quality assurance of products (Shao, 2004, p.1). Usually, there are four parts, the first is the identification of user requirements: this study will invite 4 interviewees to conduct semi-structured interviews to understand the user requirements of current users, and through the KJ method, combined with UJM and literature research, summarize and organize user requirements in stages; The second is the establishment of design elements and the relationship between design elements: through the established user requirements into design elements and the evaluation of the direct relationship between design elements. The third is the quantitative assessment of quality house elements: through the QFD group to evaluate the relationship matrix. The fourth key design element to establish: through the weighting method to calculate the importance of design elements, to get the key design elements.

RESULT AND DISCUSSION

The interviewees were all learners who had used the English vocabulary app for learning, had used it for 2–7 years, were between the ages of 20-36, and all had a master's degree or higher in education.

The integration of UJM is shown in Figure 1.

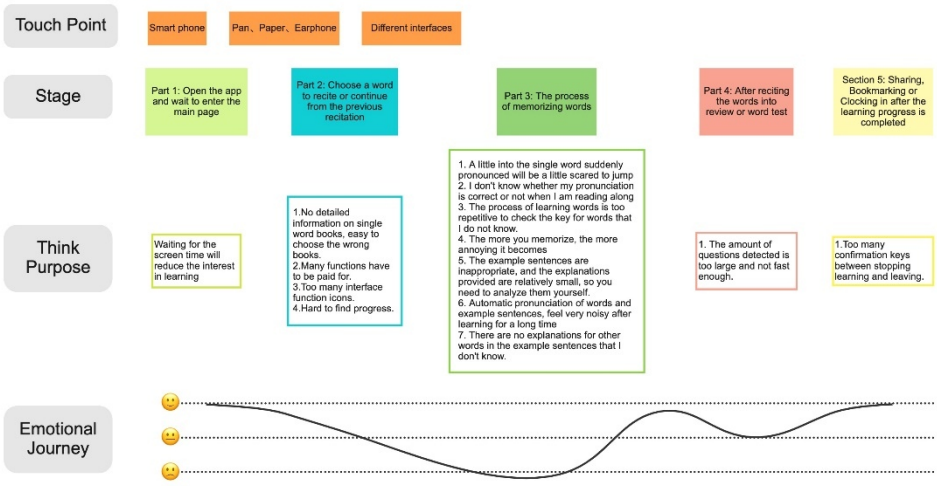

Figure 1: User journey map integration.

Touch Point: This study integrated the UJM of four interviewees, all of whom used smartphone applications to learn English vocabulary; a few interviewees used paper, pen, or headphones for learning.

Stage: According to the contents drawn by the interviewees, they were divided into five stages for summarizing and organizing.

Think purpose: In the five stages, interviewees encountered different problems and organized them separately.

Emotional journey: We learned that the interviewees were usually in a relatively good mood at the beginning of the study, and their mood decreased as the time of vocabulary learning increased, and then increased as the vocabulary learning was about to be completed; however, there were small ups and downs in their mood during the test stage, and finally their mood was the best after they finished the task of memorizing the vocabulary.

This study organized the results of UJM's think purpose and unstructured interviews to understand the different problems faced in the five stages, mainly focusing on the second and third parts. And according to the summarized user requirements, build a quality house Figure 2.

For the first part, interviewees wanted to be able to open the app quickly and enter the study without waiting too long.

In the second part, before entering the home page and starting to memorize the vocabulary, the users wanted a simple interface and a clear layout of functions, which meets the efficiency of interaction between users and smartphones and satisfies the interface design principles (Ishaq, Rosdi, Zin, & Abid, 2020). Therefore, among the key design elements, "Reasonable functional integration" and "Clearly defined interface area" scored relatively high; facing the challenges of mobile English learning, some optimization strategies given in Zhang's (2019) study also emphasized the importance of personalized learning (Zhang & Zuo, 2019). The key design element of "Personalize your study habits" also becomes very important for the different learning habits of users in memorizing vocabulary.

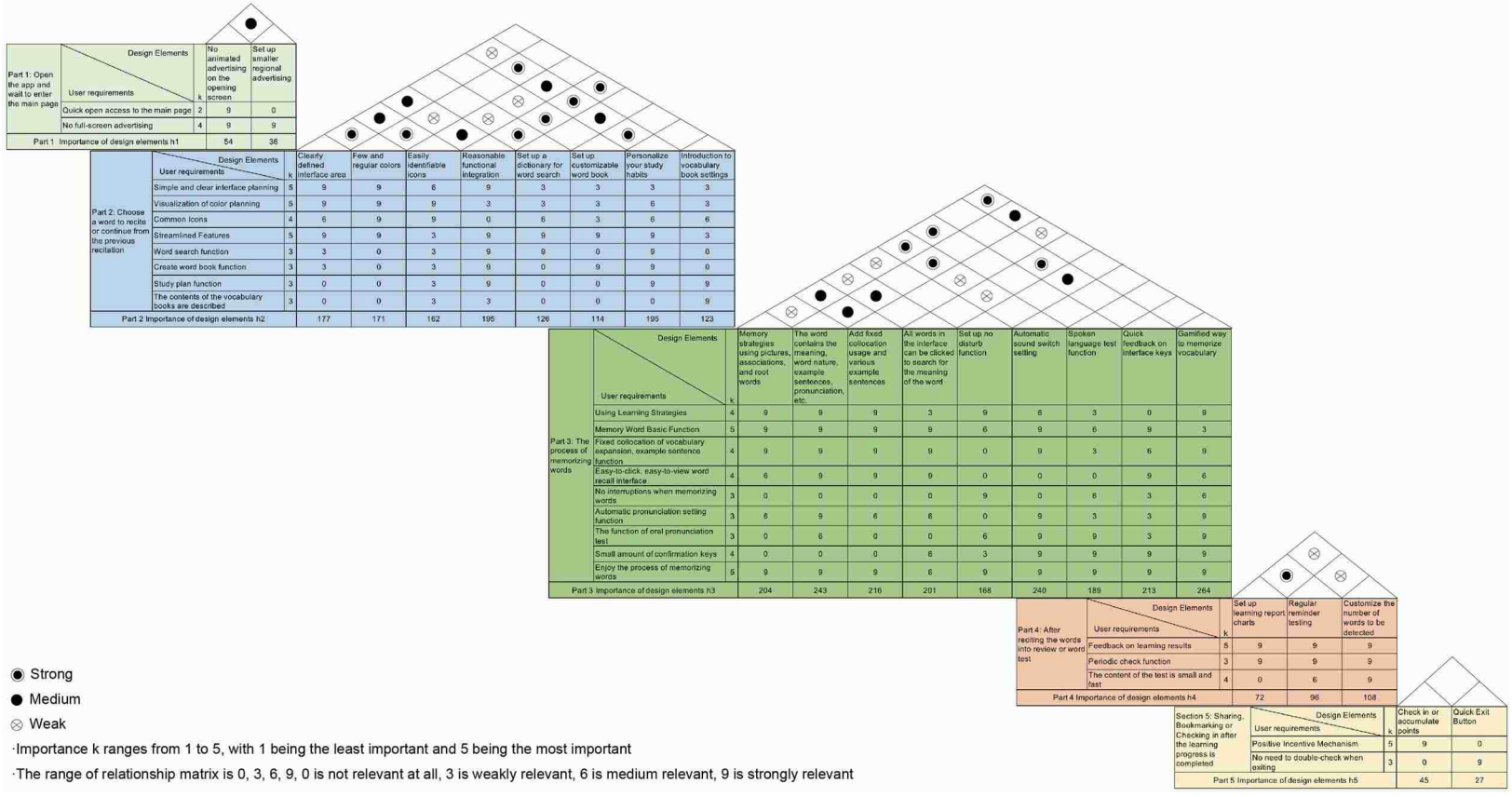

Figure 2. Five stages of quality house.

The third part, relatively, is also the time when the interviewees are in the worst mood during the whole process of usage. In language learning, a bad mood affects the information learned and thus the effectiveness of language learning (Hong, Hwang, Tai, & Chen, 2014). It is important to promote interest and confidence in learning English vocabulary at this stage. Gamification can enhance students' interest and performance in learning and motivate them to learn (Ramos Acosta, Guzmán, Rivera, & Bustillo, 2017). Therefore, among the key design elements, a "Gamified way to memorize vocabulary" is very important. When learning English on a smartphone using an app, attention is easily distracted by multiple other tasks, resulting in inadvertent loss of information while receiving it (Chen & Yan, 2016). Although the score of "Set up no disturb function" is not high in the third part of the key design elements, it still has value.

In the fourth part, during the detection phase of vocabulary, users do not always have enough time to complete a measurement, so it is important to allow users to customize the amount of content to be detected, which is also in line with personalized learning (Zhang & Zuo, 2019).

In the fifth part, the three key elements of the gamification construct are activity type, reward mechanism, and tracking mechanism (Ramos Acosta, Guzmán, Rivera, & Bustillo, 2017). "Check in or accumulate points" belongs to a type of reward mechanism that facilitates users' persistence in learning.

CONCLUSION

According to this study, users of English vocabulary learning applications are more concerned with meeting their specific requirements and seeking a positive learning experience. The following are some of the key design features of QFD: "Set up customizable word book," "Personalize your study habits," "Add fixed collocation usage and Various example sentences," "All words in the interface can be clicked to search for the meaning of the word," "Set up no disturb function," "Automatic sound switch setting," "Gamified way to memorize vocabulary," and "All words in the interface can be clicked to search for the meaning of the word."

UJM separates the entire usage process into stages so that QFD can investigate the user requirements of each stage in more depth and concentrate more on the user requirements of each detail. UJM and QFD work together to delvep deeper into user requirements. For a thorough study, the QFD concentrates on the stages of inadequacies. Additionally, it enables QFD to evaluate many stages to comprehend the salient features of the overall usage while concentrating on weak stages for an in-depth examination.

Efficient interface interaction can increase learners' interest in learning (Ishaq, Rosdi, Zin, & Abid, 2020), and the use of language learning strategies can also increase the effectiveness of language learning (Kennedy & Levy, 2008). To find a more relaxing and fun approach to learning a language, the future study may assess the efficiency of learning using various language strategies or attempt to optimize interface interactions more specifically.

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