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Mobile Learning System Combined with Adaptive Recommendation Mechanism--Taking Outdoor Learning Activities of Literature and History as An Example

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Abstract: In the courses related to literature and history, outdoor activities such as field visits are often matched to deepen students' impression on historical events and cultivate their historical thinking ability through practical exploration and interaction. However, in the process of outdoor learning, students' innate intelligence, interests and acquired learning environment often have an influence on their learning ability or understanding degree, which leads to the gap in learning. Therefore, if we can guide the adaptive learning mechanism in time and adjust the suitable learning content according to the students' individual learning situation in the outdoor learning process, it can not only stimulate the potential of each student, but also produce better learning results. In this regard, this study built a set of action-based learning systems combined with an adaptive recommendation mechanism, applied it in the study of outdoor learning activities related to literature and history, adopted mobile devices to provide students with the way of autonomous learning, and at the same time built a set of historical ability as the standard of the adaptive grading system. Through observation and analysis of students' learning situations, it adjusted the contents of learning materials and planned suitable learning strategies to cultivate students' historical thinking ability. It was hoped that when students carry out learning activities related to literature and history, they can learn more easily by step-by-step and personalized learning methods, and record their learning situation, so that they can master their own learning ability and situation, produce better learning performance, and reduce the uneven phenomenon in learning.

Keywords: Adaptive learning, recommendation system, action learning, outdoor education

1. Introduction

At present, in order to deepen students' impression on course content, most courses related to literature and history are matched with outdoor teaching activities in addition to indoor courses. Although in recent years, many studies have assisted students in outdoor personalized learning activities through mobile devices, in the process of learning, students' innate intelligence, interest and acquired learning environment will also affect their learning ability or understanding, which will lead to a gap in learning (Yen, & Lin, 2018). Moreover, when carrying out outdoor learning activities, students are already faced with a large amount of information in the real environment. If they have to receive multimedia teaching resources provided by mobile devices, students may be unable to load and even have negative effects (Chin, Lee, & Wang, 2017). Therefore, if we can combine the adaptive learning model with learning activities of literature and history related courses in the outdoor, we can adjust the learning content or teaching methods according to students' characteristics, abilities and interests, we can help students learn in a beneficial way, and also stimulate the potential of each student, so as to achieve better learning results. Therefore, if system can according to student characteristics, abilities and interests, they can help students learn in a useful way adjust the content or teaching methods, achieve better learning results. And the adaptive learning mode does just that.

Therefore, this study proposed a set of action-based learning systems combined with an adaptive recommendation mechanism and applied it to outdoor courses related to literature and history.

With simple and convenient mobile devices as learning media. And developed three kinds of history learning abilities from the shallower to the deeper: "Memory ability", "textual research and judgment ability", "ability to think and restate history" as standard with adaptive mechanism. Through a step-by-step and personalized learning method, it makes it easier for students to understand the content of the course and can better master their own learning ability and situation and improve learning efficiency.

2. Action Learning System Combined with Adaptive Recommendation Mechanism

The system includes six modules, the structure of which is shown in Figure 1, which are textbook grading module, multimedia display module, test question module, recommendation mechanism module, history record module and augmented reality module: The textbook module has three abilities are classified, which are memorizing, researching and ability to have cohesive discussions. The multimedia display module can present audio, video, information and images in the learning process. The test question module is set before and after students' learning activities to observe whether the learning effect is improved after students use this system and record in the cloud. And the amplified reality module, it can provide students with scanning specific historical objects when exploring outdoors, so as to obtain virtual knowledge information and images, and deepen their learning impression by amplifying the interaction of reality. Then the recommendation mechanism module will analyzing students' answer status and learning status provide suitable learning content planning. Finally, the history record module, it is mainly divided into two categories of "learning status" and "learning achievements", which will record the learning status of each student and the learning time and integrity of each teaching material to the cloud and displayed in the system.

Because the core of history learning has slowly shifted from reciting historical facts to analyzing historical facts and explaining their own logical views through understanding history, so this study took these three abilities as the division of difficulty, which are "memory knowledge-based ability", "historical data analysis and textual research ability" and "historical thinking and restatement ability", carried out learning activities from simplicity to depth, and summarized and analyzed the test results, so as to help students better understand their learning situation.

First, the ability to memory and recitation are basic learning abilities that must be possessed because in the process of learning history, we must know the details of historical events before we can understand the development process and reasons of events. Second, after understanding the occurrence and existence factors of historical facts, we can start to think and distinguish the correlation between historical materials and historical facts through historical observation, analyze historical events through historical clues, and observe the correlation among past, present and future, so that learning is not just reciting, but has more ability to analyze and understand. Finally, if students already have historical knowledge and can understand and analyze historical materials, they can rethink and extend what they have known, integrate logic and express it in their own way again, and cultivate students' critical ability to evaluate, interpret, systematically analyze, compare and reflect on historical materials.

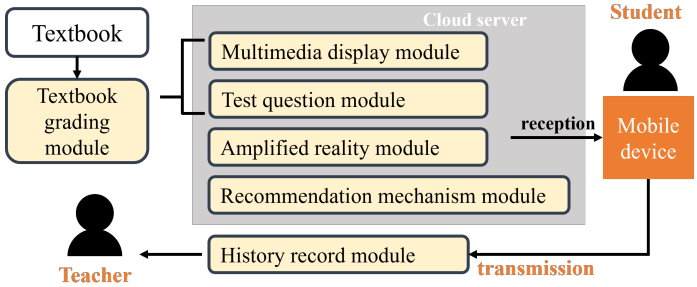

Figure 1. System Module Architecture Diagram

When students study the literature and history course outdoors, they can scan specific objects with the lens of the mobile device, and then display the test picture of the course, as shown in Figure 2. When the test is over, students will begin to study in formal courses, and students will be given different multimedia teaching materials according to the test results, such as Figure 3, which is the audio-visual learning picture. Then, by analyzing the test results and learning conditions, the study map will be adjusted for each student. Students will start from the easiest and the most familiar courses and learn

more difficult course contents step by step. The course activities also enables students to deepen their impression of learning content, cultivate their ability in analysis and judgment in autonomous learning, and explore literature and history by researching historical sites and historical materials. Meantime, this system will record the time when students search, in a bid to observe whether students' ability to textual research historical materials has changed due to practice and training, as shown in Figure 4.

At the end of the course, we will enter the test screen again. This test will be different from the first test, and the purpose is to understand the impact of students' learning effectiveness after learning. And, the learning process of students will be recorded, which can not only enable students to master their own learning situation and cultivate autonomous learning but also enable teachers to better understand students' learning situations, which is conducive to adjusting teaching materials in the future and assisting students' learning. Figure 5 is a systematic learning map.

Figure 2. Test Picture

Figure 3. Multimedia (audio-visual) Picture

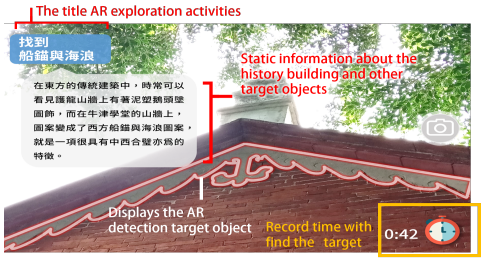

Figure 4. Exploration Picture of Expanded Reality

Figure 5. Learning Map

3. Conclusion and Future Studies

This study proposed a set of action-based learning systems combined with an adaptive recommendation mechanism, applied it to the outdoor guided learning activities of literature and history related courses. In the planning of future works, this study will implement formal experimental design and process to explore when college students use the adaptive recommendation mechanism in the field of literature and history, and probe into the influence of learning effectiveness and interest, so as to further understand whether it will affect students' cognitive load, observe the learning process of college students to understand whether this system can effectively assist students to study outdoors, and prove the contribution of this system to literature and history education by analyzing and evaluating substantive data.

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References

Chin, K.Y., Lee, K.F., & Wang, C.S. (2017). The Effects of Mobile Technology Application for Museum Tour Guiding on Students? Attention and Learning Achievement. The Effects of Mobile Technology Application for Museum Tour Guiding on Students' Attention and Learning Achievement ، 9(2), 29-52. DOI: 10.3966/2071260X2017040902002

Yen, J.W. & Lin, J.J. (2018). Research on Enhancing Engagement of Using ePUB3 eBooks and e-Learning Partner in Adaptive Flip Learning. IN: Ming Chuan University.