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The cloud classroom of the skeletal system

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Abstract

It is not easy to learn medical knowledge. How to help medical students to learn using efficient learning aids is an issue many teachers would like to resolve. This study integrated web pages and mobile devices into the teaching materials through "The Cloud Classroom of The Skeletal System" to improve interactions in learning. By combining a multi-media medical interactive learning platform, using the concept of groups and games as aids for learning and communication, the diversified and interactive method can help increase participants' interest in learning so that their learning effects can be improved by doing exploration on their own.

Keywords: Skeletal System; cloud computing; medical education.

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1. Introduction

In the recent years, medical students' learning effects of medical knowledge have been declining significantly. As a result, when these students begin their internship, they are still not familiar with what's taught in classes. This phenomenon may lead to lesser gains in their internship. Another consequence is that when they become medical personnel, they need to spend more time getting to know their environment and adapting.

With the popularization of mobile devices, students have become used to the stimulation from digital sounds and videos. It is common that they find the traditional teaching method rather boring. Especially, they often encounter abstruse English words while learning medical professional knowledge. They also need to memorize various proper nouns such as nouns related to bones, skin, nerves, and lymph. If they don't learn these nouns by heart, it's difficult to use them well. In that case, they will have to look up these nouns and understand them while learning.

Medical students' learning obstacles in learning observed are summarized below. These issues are also the issues this study aims to resolve.

1. Difficulty in memorizing proper nouns.
2. Inconvenience of carrying thick and heavy text books.
3. Easily forgetting what was learned in a class.
4. Lack of interactive teaching methods.
5. Finding classes dull and boring.

This study aims to design a digital interactive learning platform to resolve these issues. The main purpose is to improve learners' learning efficiency. Although there are a lot of teaching tools available in the market, there are very few medical interactive learning platforms integrated with multi-media. This study goes beyond the traditional ideas and promotes a new learning model, using the concept of groups and games as tools for learning and communication. The diversified and interactive methods applied can help increase participants' interest in learning, so that they are willing to explore and discover patterns on their own instead of learning these patterns from their teachers directly. Web pages and mobile devices are integrated with teaching materials to develop more interactions.

2. Related Work

The section of related theories and literature review of this study mainly discussed issues such as e-learning, teaching models, and learning effects. The theories which formed the fundamental structure of this study and their descriptions are summarized below:

2.1. *The influence of e-learning on teaching*

The internet has become a part of modern people's life. Information inquiry and even entertainment can be done through the internet. In this age of knowledge explosion, e-learning can perfectly meet the demand for creative knowledge with the feature of being available any time anywhere (Kneebone, 2009). It can break the geographic barrier to improve learning effect. This, in the 21st century, it has been implemented and we'll developed. And the development of mobile devices has increased the possibility of e-learning.

2.2. *The current status of e-learning applications*

The development of e-learning has changed human beings' learning environments and methods. One of the features of e-learning is that, with the help of information technology, there is no time or location

related constraint on users' learning. According to the 2012 "global e-learning market" report by Ambient Insight, the size of the global market of teaching materials with e-learning content, platform tools, and learning services would reach 41.2 billion US dollars in 2013, and 51.5 billion in 2016, with the CAGR being 7.6%. In the recent years, with the rapid growth of mobile application stores, applications have become essential tools in consumers' daily life. Educational applications have been used in more and more fields (Kneebone, 2005).

With diversified integration of digital content, some game applications also contain educational content. As a result, the market has become a newly rising market in the recent years and all related vendors want a piece of it. Examples of applications include educational institution network and smart classroom. Now, the focus is on digitalization of teaching materials and active efforts to facilitate cooperation between distributors and large technology companies. The effects and influences of e-learning are being enhanced and extended through games and clouds.

2.3. The Benefits the ARCS Model brings to Teaching

In 1987 (Keller, 1987) proposed the ARCS model. "ARCS" is the short for attention, relevance, confidence, and satisfaction, the four elements. It is a motivation model based on the teaching design model to inspire learners' learning motivation and integrated with the motivation theory and other related theories. Traditional teaching designs care less about learners' learning motivation. If the teaching materials developed for any one teaching design cannot get learners' attention or make them interested, the learning effects of that teaching design would be less than expected. Thus, if teaching design strategies can be based on learners' motivational demands in order to inspire their learning motivation, their learning performances can be efficiently improved.

2.4. The integration of clouds, social groups, and games

With the government's active promotion and the guidance of the future trend, plus the rapid development of the internet, synchronous and asynchronous teaching systems have been developed. In the future, hardware and software costs in promotion of information education and e-learning can be greatly reduced. Modern students have access to much richer information due to the advancement of information technology. It is obvious that the thoughts and concepts are very different between this generation and the previous one (Hannon, 2000). Nowadays, when students sit in a classroom, they are asked to sit quietly and listen to their teacher's lecturing. However, the life outside the classroom is filled with all kinds of seducers, such as games and social networks. It is not at all surprising that students would find classes they attend boring and dull.

According to the above description, if the advantages of multimedia e-teaching and the popularization of information technology can be integrated by designing an interactive multimedia learning strategy, it is possible that more learners will attend classes and benefit from them. This way, a ubiquitous quality learning environment can be built to improve learning effects so that when students find a field work after graduation, they can master it in a short time.

3. System Architecture

This study designed the system for two types of users, teachers and learners. When a learner uses the system, he can carry on interactive learning through the two major platforms with physical teaching aids and the system will automatically record his learning conditions and provide a summary of the

records through the computing cloud to the learner to check his own learning conditions and his teacher to find out the learner’s learning conditions in order to offer proper guidance.

The system structure contains three layers. All the system components were from cloud components. Thus, in the designing and developing process, there is no need for programming for each application platform. All that needed to be done was to rearrange the operation interfaces. This is a rather efficient way for software development. In this system, there are a lot of data of multimedia content, professional medical terms, English pronunciations, and skeletal structure associations, which are all stored on the data cloud. Based on these data, a computing cloud was designed to offer services such as learning effect presentation, real-time exams, and individual learner condition review, through both the web platform and the mobile device platform. This design also allows future extension.



Figure 1. The cloud classroom of the skeletal system system architecture

4. Implementation

This study combined the platform for smart phones and tablet computers and the web platform to interact with learners. As shown in the figure, the two main application platforms are the platform for hand-held devices and the web platform. The “cloud classroom for medical science” was built on both platforms for the purpose of improving learners’ learning effects. This is the research direction of this study.

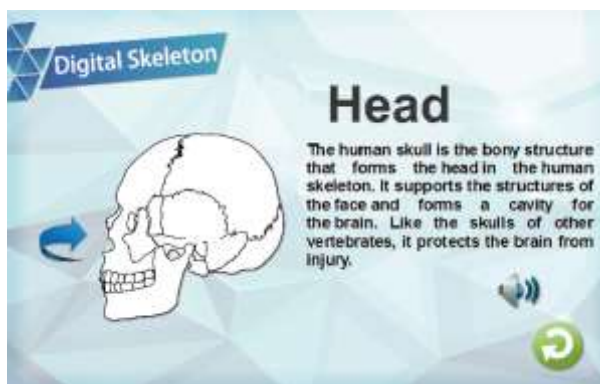


Figure 2. The mobile device platform



Figure 3. The Exams of Skeleton System

The system structure contains two main platforms, the web platform (Web) and the mobile device platform (APP). Based on the concept of social groups and the method of playing games, this system can increase users' interest. Through the cloud technology, the two main platforms can be combined with physical teaching aids so that users can learn more about the skeletal structure. The indicators were designed based on the ARCS (attention, relevance, confidence, and satisfaction) model. The use of the cloud technology largely increases the range of applications. As long as there is internet access, one can learn easily. This system offers different functions for different users and user scenarios. The functions of the "cloud classroom for medical science: skeletal system as an example" are as below:

The cloud classroom offers three functions: e-skeleton, simulation test, and real-time Q&A. Students can click on the bones on the screen for learning, taking exams, and answering their teacher's questions. Students can participate in exams any time anywhere.

Students can click on any of the bones to see details for learning. By clicking on the synchronization button on the right side the content displayed on the screen will be synchronized with what the teacher is currently teaching.

5. Conclusion

This study largely applies the "The cloud classroom of the skeletal system" to medical related departments. After it is implemented, learning records can be collected to explore the effects of digital learning on students. Also, statistical analyses can be performed based on students' feedbacks regarding

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their experiences with the system and their related learning performances to come up with conclusions as future references for researchers in the academic circle.

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