The E-learning Services System with Performance in Tajen University

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Abstract

E-learning has become one of the important parts in digital life for the sake of its convenience and accessibility even it cannot substitute the whole traditional teachings. Practically, the essence of the Information technology application on education is that Learning is the essential and the technology is the auxiliary. Tajen University started the implementation of E-learning infrastructure five years ago and paid much effort on the implementation of the course contents and management rules for E-learning. In Taiwan, Tajen is one of the pioneers in this field and acquires a great reputation. In the last semester, Tajen has made about fifty E-learning materials and took over approximately more than ten thousands student-times in E-learning courses every semester. Computer-based learning systems comes great convenience on learning. However, tremendous amount of information that comes from different sources embedded with diverse formats in the form of metadata might also cause trouble to create professional materials. In the paper by Liu, F.-J. and Shih, B.-J.[13], it provides a method to reduce the load of search engines and the complexity of content parsing. We would like to integrate the technique into our LMS (Learning Management System) to make learning more efficient. In this paper, we describe the E-learning system architecture, the experience to promote E-learning courses, and the vision of E-learning in Tajen University. We also depict the technique for improving the efficiency of self-learning.

Introduction

In recent years, because of the advance of Information Communication Technology, ICT, E-learning becomes an important way for learning. And, computer-based systems have great potential for delivering learning materials [14], which efficiently releases teachers from handling mechanical matters so they can practice far more humanized pedagogical thinking. Thus, Tajen University started the E-learning project five years age and kept paying much effort on the implementation of E-learning infrastructure and the improvement of course management for E-learning. In Taiwan, it acquires a great reputation in this field.

In this paper, we mainly share the experiences on E-learning implementation, including system architecture, promoting the E-learning courses and the vision of E-learning in Tajen University, and propose the E-learning material searching system [13] for efficiently learning. The design details will be described as below.

Motivations

Tajen was a five-year vocational college in 1966. In August 1999, Tajen was upgraded became four-year university, and subsequently with the permission of the Ministry of Education in August of 2005, it was again promoted to Tajen University, offering four-year college programs, two-year bachelor degree college programs particularly for the junior college graduates, another two-year junior college programs for general high school graduates, and the original 5-year junior college programs.

In the process of transformation, many curriculums and the quality of teachers needed the large-scale changes and adjustments. Due to the tendency of the time, E-learning is adopted as another new learning way to relax the impact on urgent requirements of the curriculum and the teachers, and to accomplish a high-standard life-long learning academic institution.

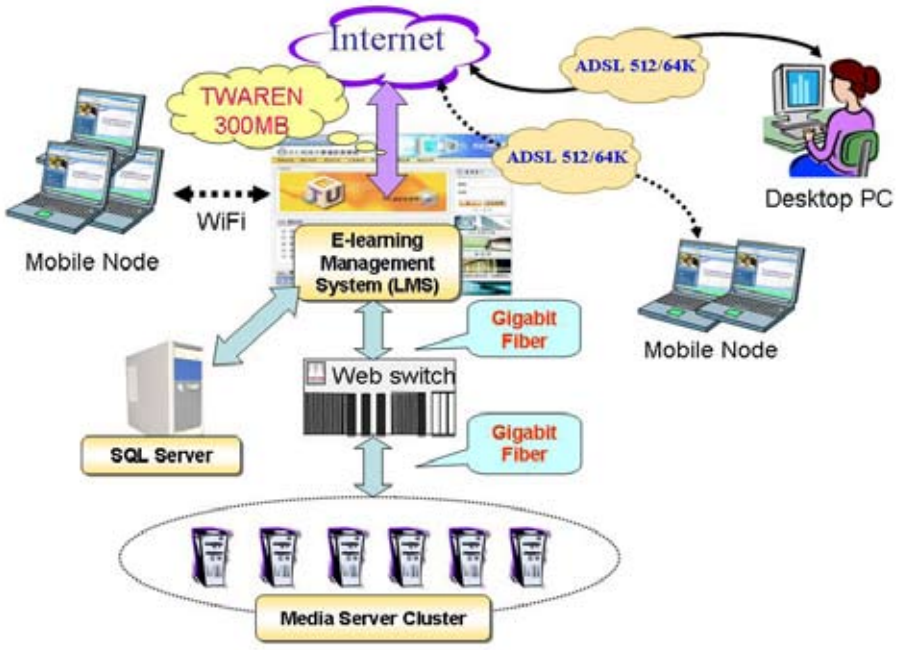
The main reasons why Tajen starts the E-learning project are listed below:
- To mitigate the quantity of the specialists.
In short period, Tajen transformed from a college into an university. The curriculums and quality of teachers made substantial changes and improvements during these years. E-learning might be a practicable way to mitigate the quantity of the specialists.
- To save the traffic time.
Tajen University has established a reputation on offering continuing educational opportunities from high school as well as vocation school graduated in Pingtung and Kaohsiung areas since 1966. In order to provide a better learning way for the night school students, especially for those who don't live nearby school, E-learning can reduce their round-trip transportation time. This will be an advantage for the recruitment of new students.
- ICT, information communication technology, gets mature.
Many years ago, to promote the competitive ability of Taiwan, Taiwan government starts the National Information Infrastructure, NII, project to establish a high speed communication network. Therefore, it is easy to access Internet at home in Taiwan. The deployment of high speed communication network is one of the most important factors to achieve the e-learning project.

E-learning is a prevailing and growing trend in learning field. It's not only enables educational transformation from teacher-centered to learner-centered learning, but also provides an alterative educational method.

System Overview of E-learning in Tajen University

Learning satisfaction and perceived learning value can be used in an overall evaluation of digital content, instructor, and e-learning system combined. Since all learning activities are conducted and mediated by the e-learning system, the system's performance becomes vital to learning satisfaction and perceived leaning.[11]

Figure 1: System Overview of E-learning Environment of Tajen University.



Taiwan has became an ICT developed maturely country. Tajen University also has an established completely high-speed campus network. As shown in Figure 1, it shows the E-learning environment in Tajen. It offers high quality network services with a high-speed Gigabit backbone network. A cluster of six media servers is used for steaming

services. In order to get the better resource utilization, maximize throughput, and minimize response time, the dedicated web switch device is used for load balancing among servers.

Problems for Content Management

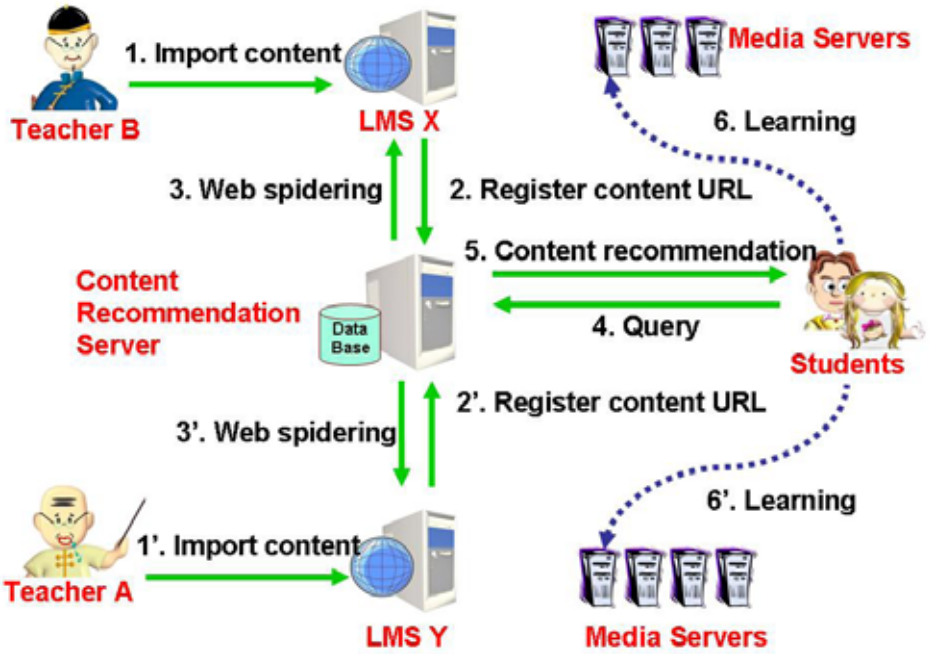
E-learning was a new learning pedagogy in Taiwan. However, there is no administration rules of e-learning courses can be followed, and requirements of functionalities of e-learning platform are not formulated. Thus, Tajen had to establish its own management rules of course derived from the criterions of traditional course management, such as the minimum required time of the use of e-learning system proportional to the credit of courses, the number of post messages in topic forum…etc.

While human knowledge is accumulated to a huge mass of data, it will be aware that the self-directed learning style based on the problem-oriented policy will be raised again and will become one of adaptive learning modes in the knowledge-explosive era.[6,14,16] Tajen has developed more than fifty E-learning materials including thousands of course units. These e-learning course contents, compliant with SCORM [12,17], are mostly created with Cyber-Link Stream authoring tools [7] and are distributed among the media server cluster. How to provide learners with a friendly user interface for efficiently learning is our current objective.

Integration with E-Learning Content Recommendation System

On E-learning material searching, we applied data mining, web [3,8] and JAXB [9] technology to implement the content search system for Tajen [13]. In the system design, the association rule [1,2,5,10]is mainly adopted to find out the relations among these keywords that learners used for searching the content. And, the collaborative filtration [15,16,18] is employed to improve the reliability of the searching results and is applied to automatically filter the correct keywords of each courses. The processes of the content recommendation system are described as shown in Figure 2.

Figure 2: The process flow of the content recommendation system.



Step 1: Firstly, a teacher imports digital contents into the LMS.

Step 2: The content contributor registers the content URL address in the content recommendation server.

Step 3: The web spider in the recommendation server will automatically visit the referred documentations and maintain the metadata of these courses in the database.
Step 4: Learners query their interested content with keywords from the content recommendation server.
Step 5: And then, the recommendation server will suggest associated topics to the learners through collaborative learning.
Step 6: Learners follow the recommended content list to choose the material. At the same time, the system also records the usage behaviors for further filtering.

In the content searching and recommendation system, learners can search contents by using multiple keywords concurrently like in regular search engine. Meanwhile, queries based on content creator, topic, content body are also allowed. Users start from the first-level keyword search, the related material will be tabulated just like the regular search engine. Below each topic, the collaborative filtered keywords will be presented. Users can follow the links to obtain associated topics in registered course materials. In this way, users can recursively trace down the topic tree with virtually infinite search levels. As shown in Figure 3, the related content with the "pencil" word is filtered out.

Figure 3: Related words and the content list with the "pencil" word.

Results: What we have done

Table 1: Related Statistics for E-learning courses in Tajen from 2003 to 2008.

School Year	# of teachers	# of courses	# of classes	student-times
2003	76	11	172	6,448
2004	122	28	306	13,303
2005	101	29	250	11,850
2006	128	44	279	18,390
2007	175	71	384	22,414
2008	180	81	414	22,697

Tajen University is one of pioneers in e-learning area of Taiwan. On the operations and management of e-learning

courses, it developed its own way to regulate the e-learning courses. There are also some strategies to stimulate the motivation of participants to devote themselves to the learning activities in the virtual classrooms, for example to hold a competition about the participation level of teachers and students. According to our statistics, the number of student-times registered in E-learning courses is increasing as shown in Table 1. The result of students' satisfaction questionnaires are average in 3.7~4.1 point by Likert scale.

Conclusion and Future Works

Tajen University has investigated the e-learning for five years and has made more than fifty E-learning materials, thousands of course units. The e-learning center of Tajen University takes over averaged more than ten thousands student-times in every semester of E-learning courses. In order to improve the efficiency and correctness of course data transfer, we have also implemented the data-bridged application between the educational administration system and LMS. Additionally, we proposed the content recommendation system to assistant learners with efficient content navigation. We think such a deployment will be helpful in achieving the better learning performance and a higher learner's satisfaction.

From the usability perspective, the E-learning material searching system provides teachers and learners with an autonomous abstract environment. From the educational perspective [4], such the mechanism can suffice the exploration of various learning styles, tendencies of interests, and professional abilities. It turns learning into an information-guided dynamic and is also feasible for problem-based learning [19]. Therefore, this searching tool helps users to "discover" new knowledge by presenting explicit and implicit knowledge so that they are able to see ideas and concepts that are most unexpected. This learning process matches the basic principles of constructivist learning.

We believe that as the amount of material grows, the better the performance of the E-learning environment offing learners. Take study in learners' own hand including the spirit of Web 2.0 will carry out in Tajen University.

References

01. Agrawal, R., Imielinski, T., and Swami, A.(1993), Database mining: A performance perspective. IEEE Transactions on Knowledge and Data Engineering, 5(6):914-925. Special Issue on Learning and Discovery in Knowledge-Based Databases.
02. Agrawal, R., and Srikant, R.(1994), Fast Algorithms for Mining Association Rules. Proc. of the 20th VLDB Conference, Santiago.
03. Apache Software Foundation. Jakarta Project-HttpClient. Available at http://jakarta.apache.org/commons/httpclient/.
04. Ausubel, D. P. Educational Psychology: A Cognitive View. New York: Holt, Rinehart & Winston. 1968.
05. Brin, S., Motwai, R., Ullman, J.D., and Tsur, S.(1997), Dynamic Itemset Counting and Implication Rules for Market Basket Data. ACM SIGMOD Conference on Management of Data, pp. 265-276.
06. Chen, H., Houston, A.L., Sewell, R.R., & Schatz, B.R.(1998), Internet browsing and searching: User evaluation of category map and concept space techniques. Journal of the American Society for Information Science, 49(7): 582-603.
07. CyberLink Stream Author. Available at http://www.cyberlink.com/multi/products/main_7_ENU.html.
08. Derrickoswald and Somik. HTML Parser. Available at http://htmlparser.sourceforge.net/
09. Ed Ort, and Bhakti Mehta (2003) Java Architecture for XML Binding (JAXB). Available at http://java.sun.com/developer/technicalArticles/WebServices/jaxb.
10. Han J., J. Pei, and Y. Yin (2000), Mining frequent patterns without candidate generation. Proc. of the ACM SIGMOD Conference on Management of data.
11. Lee, Y.-K., Tseng, S.-P., Liu, F.-J., Liu, S.-C.(2007), Antecedents of Learner Satifaction toward E-learning ,The Journal of American Academy of Business ,Vol. 11, Num. 2.
12. Li, Sheng-Tun and Lin, Chu-Hung (2005), On the distributed management of SCORM-compliant course contents. Advanced Information Networking and Applications, AINA 2005. 19th International Conference on Volume 1, Issue, 28-30 March, pp. 221 - 226.
13. Liu, F.-J., Shih, B.-J.(2007), E-learning Activity-based Material Recommendation System, Interactive Technol-

ogy and Smart Education, Vol. 4, Issue: 4, P.200-P.207.
14. Masiello, I., Ramberg, R., & Lonka, K.(2005), Attitudes to the application of a Web-based learning system in a microbiology course. Computer & Education, 45, pp. 171-185.
15. Mladenic, D., & Grobelnik, M. (2003), Feature selection on hierarchy of web documents. Decision Support Systems, 35, pp. 45-87.
16. Shih, B.-J., Shih, J.-L. & Chen, R.-L.(2007), Organizing learning materials through hierarchical topic maps: An illustration through Chinese herb medication. Journal of Computer Assisted Learning, issue, Volume 23, Issue 6, pp. 477-490, Dec. 2007.
17. SCORM 2004 3rd Edition. Available at http://www.adlnet.gov/.
18. Smith, K. A., & Ng, A. (2003), Web page clustering using a self-organizing map of user navigation patters. Decision Support Systems, 35, pp. 245-256.
19. PBL e-learning center, From: http://pbl.nurse.kmu.edu.tw/PBL-web-resources.htm.