Analysis of Base Technologies for Building Smart Learning Service Environment

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Abstract. With the recent rapid transition of computing environment from PC based to smart device-based, there is increasing interest in smart device-based smart learning services combining traditional e-learning services with new information technologies. The construction of smart learning service environment is possible only through the application of new technologies to various components including contents execution platform. With regard to the production and delivery of contents, many LMS vendors have not been active for contents services through native apps optimized for a specific mobile platform due to high cost of development, low utility, and difficulty in maintenance and management, but recently, they are giving attention to the development of HTML5-based contents operable on various mobile platforms. Currently, however, smart learning services are no more than the delivery of some conventional e-learning services to mobile devices. Thus, this study purposed to explore different components of smart learning service platforms and to analyze base technologies for building smart learning service environment.

Keywords: Smart Learning, Mobile LMS, Intelligent and Customized Contents, Ubiquitous Technology

1 Introduction

As computing environment is evolving fast from PC-based to mobile device-based, smart learning is appearing along with the expansion of e-learning contents service environment to smart phones and tablets. E-learning is differentiated from websites because LMS, an e-learning service platform, manages courses, contents and learners in addition to the delivery of contents to the Web. In smart learning as well, LMS stills play key roles. Moreover, because smart devices such as smart phone and tablet contain various hardware sensors in addition to PC functions, they forecast the emergence of many different types of contents. That is, smart learning means more than receiving e-learning contents on a mobile device.

In actuality, along with the increase of knowledge-based services through newly emerging devices in ubiquitous computing environment such as smart phone, GPS,
LBS, RFID and USN, people are giving attention to interface connecting such devices and services to consumers, namely, context aware technology.

Thus this study purposed to examine base technologies for constructing smart learning services, to find the advantages of platforms for smart learning services including traditional e-learning services, and to suggest directions and potential for contents services.

2 Base Technologies for Building Smart Learning Environment

Recently smart learning is being defined and studied in diverse ways. KINSHUK (2010) emphasized that smart learning is different from e-learning using smart devices, and KTOA (2012) defined smart learning as ‘smart device-based intelligent, customized learning service.’[1][2][3][4]

<table>
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<th>Definitions</th>
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<tr>
<td>Kerris, 2012</td>
<td>Technology and environment that solve problems arising from the application of contents, solutions, and services implemented the PC to mobile environment</td>
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<td>KTOA, 2012</td>
<td>A driving force to reform education systems including educational environment, education contents, education methods and evaluation through intelligent customized learning systems for strengthening 21st-century learners’ competence</td>
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<tr>
<td>Wiki</td>
<td>Means customization, intelligence, fusion, social learning, collective intelligence, etc. attained through smart infrastructure and smart ways such as clouding, network, servers, smart devices and embedded devices.</td>
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<td>KINSHUK, 2010</td>
<td>Does not mean another type of e-learning simply using a mobile device or smart device, and a difference between smart learning and mobile learning is that smart learning is a paradigm indicating the future direction of e-learning.</td>
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There are two major issues in the paradigmatic change from traditional e-learning to smart learning. One is, in the aspect of contents delivery, that the platform should be flexible enough to embrace future computing changes in smart learning environment because existing contents have been developed with less flexible tools such as Flash and ActiveX. The other is the provision of smart device-based intelligent, customized services[1].

One of representative technologies for such intelligent customized learning services is context aware technology, which means software and hardware technology predicting and satisfying users’ needs in advance by analyzing users’ life pattern, vital signs, surrounding environment, etc. and deriving contextually optimized functions.
2.1 Flexibility of platform

The most common form of learning contents in traditional e-learning is Flash in the form of RIA (Rich Internet Application). Besides, there are standard contents and documents. The most crucial problem of Flash or standard contents is that such contents are hardly applicable on mobile platforms because they are created with technology dependent on specific vendors. Standard contents also need access to LCMS (Learning Content Management System) for the process of contents packaging, extracting and delivery, but these tasks cannot be carried out efficiently in mobile environment.

Recently, contents are produced in the form of native app that is mainly to be installed on a mobile device. However, native apps are dependent to a specific mobile platform, and therefore they should be supplied differently for each platform. What is more, the development of native apps is costly, and developed apps are not flexible to changes in computing environment, which causes difficulty in maintenance and management. Accordingly, we need to develop HTML5-based contents operable on various mobile platforms. At present, of course, we have to adopt native functions of low flexibility for many parts, but we expect gradual improvement in the future.

2.2 Form of learning

Thanks to the advance of wireless network technology running on personalized mobile devices such as tablet, smart learning is developing to the form of bi-directional learning. With this trend, platform supporting environment for interaction among the involved parties of e-learning is evolving to environment that enables smart device-based real time interaction, for example, smart learning through participation, sharing and cooperation based on Social Network Service.

2.3 Development of intelligent customized contents

In smart learning environment, the learners want to be provided with various learning contents in different teaching methods at any time and in any place based on a personalized mobile device. This is the foundation of context aware technology that can collect and analyze information on the learners’ activities and give feedback, and it improves the learners’ educational environment and facilitates learning customized to individuals.

As smart learning is characterized by mobility and personalized mobile device, accessibility to information is higher, the cycle of information is shorter, and the volume of data is larger than that in PC-based e-learning. Therefore, we need a technology for processing big data, and intelligent customized learning can be achieved through optimization. Cloud computing technology is also expected to be essential for the efficient low-cost operation of infrastructure such as hardware and network required in running systems like LMS[5].
3 Conclusion

In this study, as an effort to build smart learning service environment, we examined problems in conventional e-learning services and explored several components of smart learning service platforms. In addition, we analyzed base technologies for smart learning service environment flexible to changes in future computing environment.

Smart learning does not mean simply being provided with e-learning services on a mobile device, but is having intelligent customized learning services optimized for the learner on a personalized smart device.

For building smart learning environment, accordingly, we need to adopt new information technologies such as context aware technology, big data technology and cloud computing into traditional e-learning services. Based on this environment, we expect platforms more flexible to changes in future computing environment, a larger variety in the form of learning, and much easier intelligent customized learning.

References

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