

Design of Knowledge Management Learning System based on Service-Oriented Architecture

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Abstract

In this paper, we propose a framework of Knowledge Management Learning System (KMLS) for adult education based on a learning process and a Service-Oriented Architecture (SOA). Accordingly, this paper presents a case example to describe how to aid adult learning and making e-Learning more effective according to the principles of constructivism, knowledge management (KM) and the characteristics of adult learning and lifelong learning.

1. Introduction

The major characteristic of e-Learning is learning anytime and anywhere via Internet for learners. Today's generic learning systems lack the concept of pedagogy theories. Consequently, the e-Learning potential is not fully exploited. In other words, learner's learning behavior and attitude is inactive and unwilling, so the learning motivation and intention of learners cannot be elicited.

Knowledge not only includes data, information, knowledge, and wisdom but also distinguishes between tacit and explicit knowledge. Personally process of knowledge construction can be divided into five levels as follows, know-what, know-how, know-why, care why, and perceive how and why [1]. The process of knowledge converting is externalization, internalization, intermediation and cognition [2] by dialogue and learn-by-do-it to achieve conversion. Consequently, the process of knowledge management is innovation, acquisition, share and application [3].

Constructivism emphasizes the knowledge construction by learner actively exploring and discovery. The learners have motivation search related information to address their problems, construct knowledge, and achieve effective learning. Learning viewpoint of

constructivism includes emphasis on experience of learner, placing the learner in the central role, creating conflict situation, mutual deference and interaction style of learning. Constructivism also emphasizes the collaborative learning. A progress of collaborative learning focuses on teamwork and aidance some generation to interact, assess, and collaborate in the social environment. Collaboration process has five phases including co-presence, awareness, communication, collaboration and coordination [4].

This paper uses the constructivist's orientation in adult learning, including experiential learning, self-directed learning, perspective transformation and reflective practice.

Based on the above concepts of adult learning, we intend to design the e-Learning platform with the functions to provide information to everyone in anytime and at anywhere. The first functionality of Knowledge Management Learning System (KMLS) is learning contents presented by vision (i.e., web browser) and voice (i.e., voice device, phone, cell phone) to provide learners who are less technology-literacy and visually disabled to join learning. Secondly, KMLS not only delivers explicit knowledge (i.e., data collection, classification etc.) but also associates with collaborative learning (i.e., learning communities) to transform tacit knowledge into explicit knowledge by consultation, assessment, discussion and sharing experiences. Thirdly, the subject of life education is everyone needs to face and to develop unrestrained by age, gender, and avocation. Finally, a case example of this paper integrated theories (i.e., motivation, cognition) and practices (i.e., activities, assessment tool) of collaborative learning to help adult achieve the lifelong learning.

2. KMLS Overview

KMLS is a learning management system (shown in Figure 1) that provides a complete-learning environment for learners. Additionally, the system not only provides diversity of domain knowledge and learning contents based on service-oriented architecture (SOA) but also enhances the learning functionality by presentation of voice user interface (VUI) and web (GUI). Therefore, the learning scope is no longer limited on default knowledge of generic LMS. KMLS uses VoiceXML markup language [5] to support the dialogs between system and learners. The related works in our lab can be found in [6], i.e., VUI of KMLS.

A Service Oriented Architecture (SOA) is a distributed system form. We use the part of SOA functionalities in our system, i.e., service registry [7]. Each learning object provider (owner of LO Service) publishes or updates its service description (Web service definition language; WSDL) to the registry directly. KMLS (service requester) supplies discovery criteria to the registry and selects a suitable service description (i.e., LO Service) based on its associated functional description and capabilities. Therefore, that will bind interaction of service between the KMLS and LO Service.

KMLS has four subsystems, and the functionalities of each subsystem will be explained as follows (Refer to Figure 2).

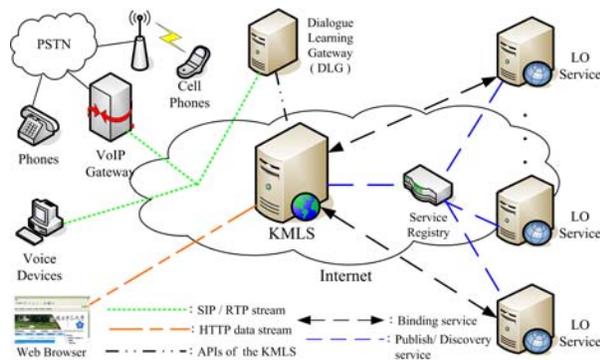


Figure 1. Framework of KMLS

The **Dialogue Learning Gateway** deals with the content-to-voice translation and translates VoiceXML files into voice to learners. The learners can talk or press DTMF (Dual-Tone Multi-Frequency) keys with this system from VUI by phones or other voice devices. The method of presentation is a dialog between learners and KMLS [6].

The **Learning Activities Subsystem** provides individual and collaborative learning environment for learners. A learner's activities include attending courses, searching information and scheduling, etc.

When learning activities of a learner is progressing, it will continue to supply related learning activities and keep record of learning status to obtain learning portfolios which can be put into repository.

The **Learning Auxiliary Subsystem** deals with guiding learners to learn effectively. Before services are initiated, a tutor has to reedit the additional objects and attributes (from learner view points) to the original learning program. Therefore, it actively monitors the learner's learning process and further supplies related suggestions to the learners.

The **Instructional Design Subsystem** provides editing learning program and searching information for authors. According to collected information, an author can define the attributes and relationships of learning objects to establish learning program. Therefore, the learning program can be transferred to the repository of KMLS and delivered for learners to self or collaborative learning.

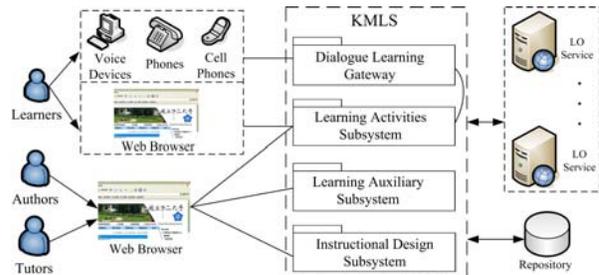


Figure 2. Architecture of KMLS

3. Case example

Today, many people lack of life education, and the departure of values in the Taiwan society generates a lot of social problems, e.g., crime and suicide for love, etc. Therefore, we select the gender relationship of life education as a discussing subject for learners shown in Figure 3.

In our development system, LCMS stores learning resources, such as books, teaching materials, media, learning lists, and problem-based reports. Learning portfolios include login frequency, discussion experience and learning experience (i.e., grade, abstract, question, reflection, and opinions).

Authors and tutors design suitable courses for learner according to the collection of related information from LCMS, the ontology supplier and the learning portfolios. An author needs to define clearly learning motivation by collecting full information of subject and feedback from cooperators of group shown in Figure 4.

Motivation can be distinguished between extrinsic and intrinsic motivation. In the behavioral (or extrin-

sic) phase, an author defines clearly learning goals of a subject, and assessment tools provide test scores, tutor's commands and rewards. In the social (or intrinsic) phase, tutors provide guidance, help, and counseling to collaborative learners [8].

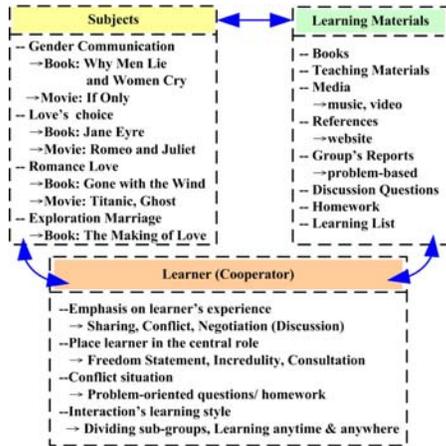


Figure 3. Learning activities of Gender Relationship

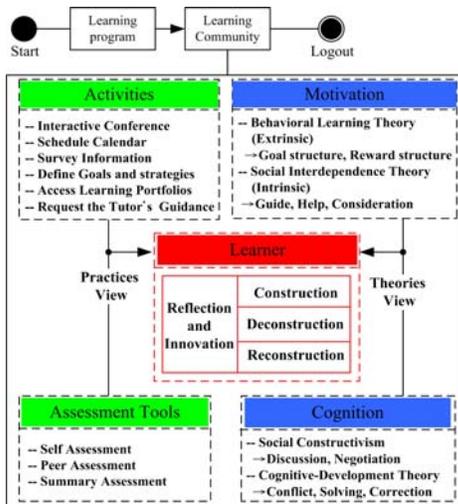


Figure 4. KMLS Architecture of Collaborative Learning

Cognition process is not only discussion and negotiation continuously but also conflict, solving and correction between learners [9]. For instance, the authors design a conflict situation, such as a subject of debate, problem-oriented homework for learning community. Through discussions (anytime and anywhere), such as sharing experiences, expressing conflict opinions and negotiation, the cooperators can achieve cognition and behavior's transformation. Within these procedures, cooperators can express their opinions and judgments

freely and the tutor will play a role of learning counselor.

Finally, we use the assessment tools, such as self assessment (e.g., Likter five-point scale), peer assessment and summary assessment (tutor's command) to assess the learning transformative process of the gender relationship. According to the records of learning portfolios, tutor's counseling, problem-solved assignments and assessment reposts; we will know whether the learning community can facilitate the reflection and innovation of the gender relationship or not.

4. Conclusion

In this paper we propose a knowledge-construction-based KMLS to facilitate collaborative learning more efficiently and effectively. Constructivism will play a crucial role in enhancing the value of knowledge management in this learning framework. Additionally, our system is useful for visually disabled people. Because of their eyesight, they cannot get information from the Internet over GUI, but they can learn online through KMLS. Adult can learn anytime and anywhere through this system by phones. Therefore, the convenience of mobile learning can assist adult's lifelong learning.

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