論文
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Design and Implementation of Teacher Supporting Component on Web
(웹 기반 교육 시스템에서 교수지원 컴포넌트의 구현)

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ABSTRACT

The value of Web in information societyis increasing in the field of education. Web Based Instruction (WBI) has an unlimited possibility of access the information. It also overcome the constraint of time and space more than the previous class learning method. The previous WBI system informed the results of study to learners after a professor's lecture and test was given. The uniform test didn't make the professor recognize the learner's evaluation according to the level of the learner and it couldn't be a reason to change a teaching method.

In this paper, we discuss the Learning Evaluation(LE) component which can support a teaching method to teachers. We suggest LE component for supporting teachers as suggesting visually the test result of pre-test by step and post-test with several ways after analyzing, designing and realizing the evaluation of the test based on CDP(Component Development Process).

Keywords : Component, WBI, LE(Learning Evaluation), CDP(Component Development Process)

요 약

최근 웹 기술의 확산과 정보기술의 발달로 교육분야에서 컴퓨터의 가치는 더욱 높아지고 있으며, 기존의 교실위주의 수업보다 시간적 공간적 제약을 덜 받게 되는 WBI(Web Based Instruction)는 무한한 발전 가능성을 제시하고 있다. 하지만 기존의 WBI에서는 교수가 수업 평가 후 학생에게 수업의 결과를 알려주는 형식이었고, 또한 학습자에게는 일률적으로 평가가 적용되어 학생의 수준에 맞는 수업을 할 수가 없었으며, 교수의 입장에서도 학생들의 평가 결과가 수업의 질을 높이거나 내용을 변경시킬 적당한 근거 제시의 어려움을 가지고 있었다.

본 논문에서는 수준별 학습을 위한 단계별 예비 테스트와 학습 후 다양한 방법으로 테스트의 평가내용을 시각적으로 제시하고, 또한 교수가 평가의 준거를 입력하고 학습자의 평가결과와 교수의 평가준거를 비교할 수 있는 교수지원 컴포넌트를 설계 구현한다. 이는 체계적인 평가 방법론이 되고 학습의 패러다임을 바꾸거나 과목을 변경할 경우, 그 결과에 따라 교수 방법의 변화나 수업내용을 변경하고자할 때 용이하다. 또한 유사한 다른 패러다임의 WBI 시스템에서도 이미 개발된 컴포넌트를 사용함으로써, 유사 응용 시스템의 개발 시 제시된 컴퍼넌트 사용의 용이성과 이식성, 재사용성을 높일 수 있게 한다.

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1. Introduction

Web Based Instruction system is getting more and more important in the field of the education and the education paradigm is changing from teachers to learners. We are also asking the new instruction method, which can effectively apply to the scene of the education that is rapidly changing. Modern software system of instruction on web are becoming increasing expensive to build and maintain and users are becoming more sophisticated in terms of the capability they expected. To build such systems, Component based model is promised candidate paradigm to meet this problems. Not only in education but also in various application domain, component based development can be addressed within a more formal and defined process resulting in more reliable software that can evolve over time.

This paper discusses the individual learning out of the uniform aspect of the previous teaching. We also suggest the component development process to build LE(Learning Evaluation) component. It can be used by teachers for evaluate the useless of the teaching method or content by the learner's own learning result. Teachers can have the exact and rapid teaching evaluation. We can use the LE component easily when we systematize the test method or change a paradigm of study. We can increase the possibilities of easiness, transplantation of use and reuse in WBI system of a similar other paradigm.

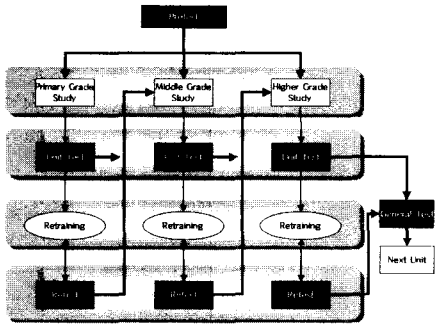
2. Related Work

2.1 WBI System

The former CAI in the situation, which is concerned in incongruence, is aspect of quality, quantity and variety is not followed by careful analysis about characteristic of learner. Recently, the popularity of the web makes people's interests about CAI and WBI including web increase.

WBI is activity transferring intentional reciprocal relation through web to develop learner's knowledge or capability. And magnifies Internet access of people and web browser to give education of the various media.

At present, WBI is point to Level learning. Level learning is that the teaching matter is different according to the learner's level. And suitable level learning should have recognized that basic knowledge, progress of learning, goal of learning is griped by level learning process. So learning process is parallel and this method is implementation to individual learning. The parallel level learning is shown in [Fig.1] due to carrying out individual learning [1].



[Fig. 1] Parallel level learning

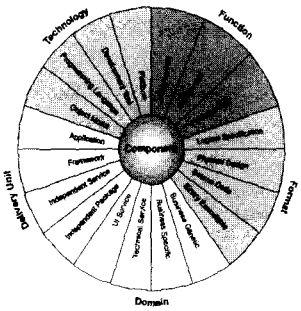
However, in the previous WBI, students just learned the material instantly that teachers gave or their learned matters were evaluated. Teachers didn't receive the methods of the teaching evaluation. So, teachers couldn't recognize whether the teachers' material or teaching methods were proper to students, and because the individualization abilities to give each student proper information is very desirable, there are a lot of decreases.

There is a problem that we don't have method to realize the trouble of service produced by teacher [2].

2.2 Component

One performs component as software performed in the physical logical devices or more interface

based on a special type of interface. This is a contract promised already, so it is reflected as the duty of special component to describe later and the component developed independently is applied in the situation of the standard implementation and run time. The component foundation is applied by the certain rules, which expect reciprocal action of components, and the system is based on the type of a few components. Also, it takes each part in the system and is described as interface [3].



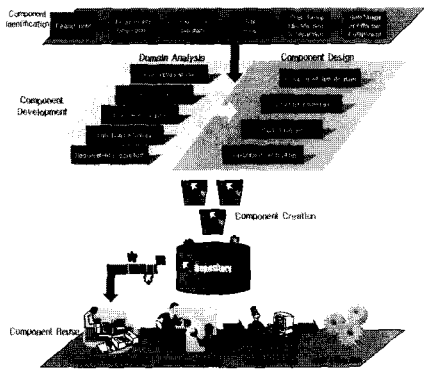
[Fig. 2] Component structure

Component classifies, Function, Format, Domain, Delivery Unit, and Technology like [Fig. 2] And component is easy to change and reuse software because each sector is unified and service is possible only through interface. The each step for the component development appears physical and logical difference so it's very sure.

The development objects vary business through application and unified software. Also, though they are designed as independent package or produce the other services, they are gathered and build framework and application because they have all connection. Component has merit that it is possible to reuse each other without language or development tool through broker like CORBA IDL or COM [4].

3. CDP(Component Development Process)

In order to make effectively the teaching matter for learners and use the learning result for teacher support, the process should be designed systematize with the component conception. But, In order to develop effectively component, the process is needed that realize user's requirement through the domain analysis, design and implementation for component from the real world. So this paper suggests CDP for the development component of education like [Fig. 3] CDP is divided component identification, component development, component creation, component reuse[5][6]. We just focus the domain analysis and component design for mutual relation of Teacher component and System component from this part.



[Fig. 3] Component development process

3.1 Domain Analysis

The domain analysis as the technological beginning for development component is to understand the area tried to develop. The each step is shortly described as: First, requirement description defines the all sectors like users, and system, which is required in the real world. Second the function dictionary defines the name of object, function, kind of function that is written in requirement description and which quality should be used. Third, the use case diagram is used for the requirement analysis process of system and user. It is presented by the reciprocal relation between actor and use case. The system user or external system is distinguished actor

and use case describes acting, which is performed related to actor. Forth, use case diagram signs the name and function of use case and show the main route and exceptional route. And lastly, the conceptual model signs the quality of class which is concreted by the use case, deletes unrelated classes and defines the quality. Also, it makes a list of class according to use case and adds the orders to classes and presents the conceptual class diagram.

3.2 Component Design

With the information prepared in domain analysis, component built is possible through definitions of description related interface and acting in component design. First, component description reanalyzes the result of domain analysis model and defines the certain part of the class it lets the components remain independently. Next, class diagram presents the pass of message between class methods and details quality and method.

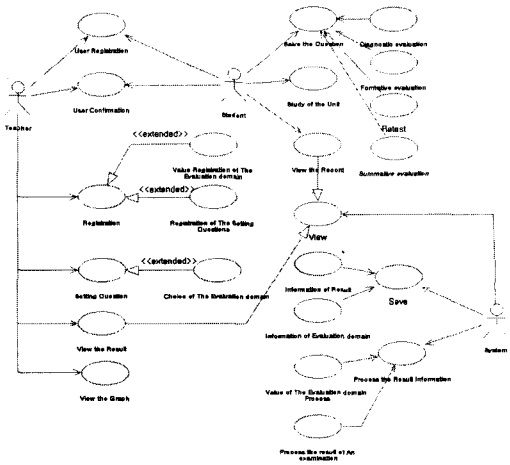
Component interface defines reciprocal relation of components as it defines interface giving and receiving services between components. Lastly, component specification can build component proper to domain requirement through it composes the distinguished information in component analysis and design and information of functional or nonfunctional component with specification.

4. Design of LE Component

4.1 Component Identification

This step is identified to use specific case for component. User compares with requirement of real world and use case. Then user recognizes that component is to be suitable of specifications.

In this paper, we just discuss about LE component that is part of Teacher Supporting component.



[Fig. 4] Use Case Diagram of Teacher Supporting Component

4.2 Domain Analysis

LE component is divided into setting contents as units, viewing the graph for teacher support, solving questions, and viewing the results. We mainly focus on registration of the evaluation domain and viewing graph. The first step for a requirement analysis is to compose the requirement description and understand the purpose and matter of this process.

<Table 1> Requirement Description

D: Requirement Description
D1: Registration Evaluation domain value D2: Registration the question D2.1: Fill up the subject name, and number of question for setting question by teacher D2.2: Choice the Evaluation domain D2.3: Setting question and Making the correct D3: Save the questions

4.2.1 Use Case Diagram

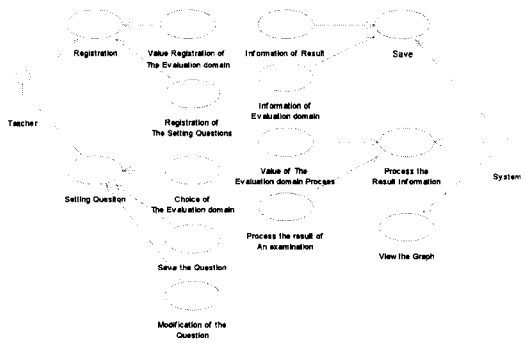
For sampling the action part from requirement description, we use the function name, function description and category represent as <Table 2>.

<Table 2> Function Dictionary

Function Name	Function Description	Category
Registration the Evaluation domain value	Registration the Evaluation domain value for Level learning	Registration the Evaluation domain
Registration the subject	Choice the subject for setting question	Registration the setting question
Registration The number of question	Registration the number of question	Registration the setting question
Setting question	Setting question for evaluation	Registration the setting question
Choice The Evaluation domain	Choice the Evaluation domain(knowledge, application etc.) for teacher supporting and distinguish the question's character	Registration the setting question
Modify the question	Modify the question	Registration the setting question
Read the result	Read the result from answers	View

4.2.2 Use Case Diagram

In the base of requirement description and matter distinguished from function dictionary, the use case diagram is described to analyze a system and user's requirement. Actor, which refers to a system user or external system, is for a teacher and a system. Use case in the center of teacher and system describes actions in system as shown in [Fig. 5].



[Fig. 5] Use Case Diagram

4.2.3 Use Case Specification

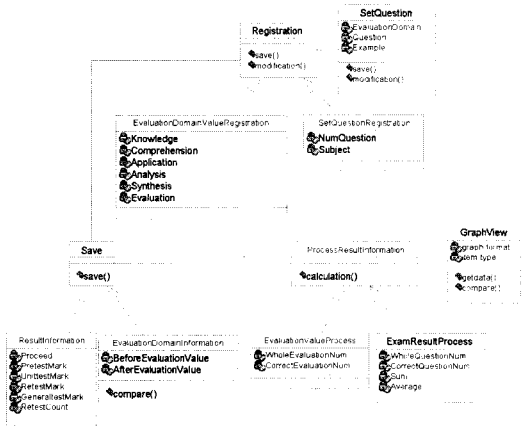
It explains the name of description and summary in the view of a teacher among the use examples of use case diagram. The registration and setting example related to teacher supporting is described among the total example, this is recognized as the main action and quality of evaluation component.

4.2.4 Conceptual Model

It is possible to extract the common example analyzed in the functionary dictionary and examples, get rid of the overlapped matter and represent each element in the type of a conception. This is used for candidate list to constitute component, and it is possible to define as each class as shown in [fig. 6] and present associative relation.

<Table 3 > Use Case Specification

Name: Teacher supporting
Short description: Registration the Evaluation domain and value, after the test, view the graph, and describe the part of Teacher Supporting.
Main Flow
1. Teacher choice the subject to setting question
2. Registration the number of question
3. Registration the Evaluation domain for Teacher support and distinguish the question's character
4. Setting question
5. Choice the Evaluation domain(knowledge, application etc.) for distinguish the question's character
6. Modify the setting question
7. View the graph from the study



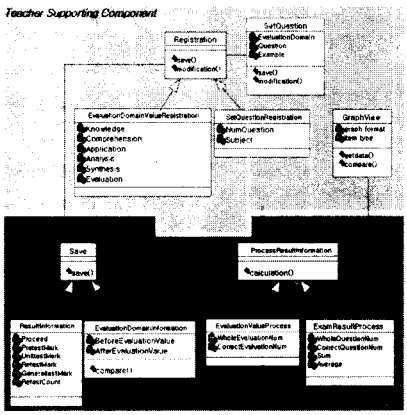
[Fig. 6] Conceptual Model

4.3 Component Design

We separate the needed recourses for real development from user's requirement in domain analysis and design the component with the resources. We design it with the candidate class from conceptual model and behavioral part through a function dictionary.

4.3.1 Component Specification

Function dictionary is used for an operation definition part of component and for the base of candidate class in conceptual model.



[Fig. 7] Class Diagram

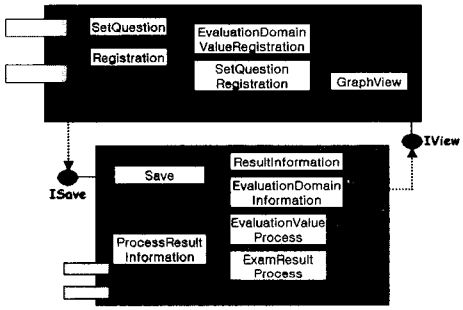
It chooses only evaluation component to realize practically and composes the specification with requirement.

4.3.2 Class Diagram

The relation of each class and component is needed to define. The component is developed in the base of conceptual model of the step of domain analysis. It is divided into the user management for services for a teacher and student evaluation and student's processing the question as shown in [Fig. 6] The part for component is signed with block and it makes the component composition to be finally designed easy.

4.3.3 Component Diagram

We organized LE component related to system component having a real action among the elements which is distinguished in the class diagram. The LE component is constituted of the item registration for a teacher support and the process the registered items. It realizes the interface for services and presents its relation. It is defined as LE Component and System component as [Fig. 8].



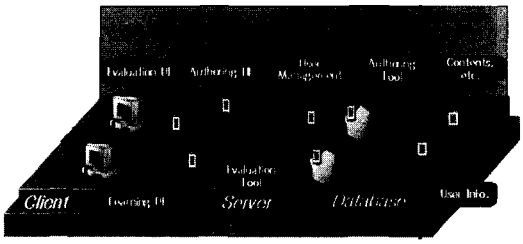
[Fig. 8] Component Diagram

5. Implementation

5.1 Implementation concepts

The general functions of LE component support a teacher to evaluate the result of learning and give him a chance to change the teaching method and contents. Teachers can access to the evaluation domain registration form and see the graph based on learning result of learner after registration. We represented as the UI service based on domain, service unit that gives service through interface and the type of binary executable codes. JBuilder 3.5 is used as basic embodied environment. The figure 8 shows the mark of web-based environment of LE component. It is realized as the type of server side

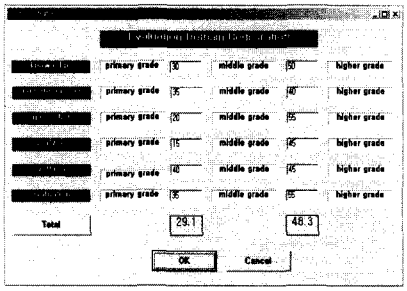
component. There are several UIs, such as evaluation UI, authoring UI and learning UI. User information and contents in the resource control also included in the component.



[Fig. 9] Web-based environment of Teacher supporting component

5.2 Evaluation

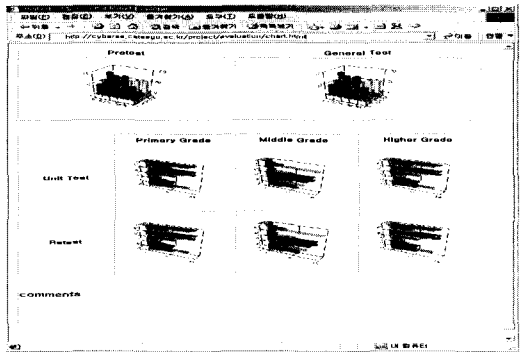
Registration interface is organized with the necessary function for beginners and realized for anybody to access. [Fig. 10] shows the value of evaluation. Evaluation values are in left frame and Level of steps are in upper frame.



[Fig. 10] Evaluation Domain Registration Form

5.3 LE Example

Visually the data of LE component learner's result is shown in [Fig. 11]. It adds the learning result of level step and comments according to the pretest and general test and the results of level learning. It is possible for a teacher to evaluate a teaching result and change the contents or teaching method.



[Fig.11] Teacher Supporting Form

6. Conclusion and Future work

The traditional restricted education is losing its meaning in informational society. Learners can escape from restrictions of time and space with WBI. Educational effects are increasing the alternative to the previous computer teaching. In other words, the previous education for producer and education in fixed time and space can be transferred to the education informational society which education demander and education, schools, students, parents and people beyond the restriction of time and space

In this paper, we discuss LE component for the uniform on WBI contents through the function of WBI and maximize learners' abilities. This component can be used to overlook the problem of teaching process and learning matter. It can be useful to guide a teacher of teaching paradigm or method. This component can be used to build WBI possibility of plug and play in the area of teacher supporting in WBI domain.

In the future, We are going to concern the reciprocal using of LE component realized in this paper. The reorganization and categorization of component must be accomplished in the field of WBI with standard.

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