

A STUDY ON DEVELOPMENT OF DIGITAL CONTENT OF HUMAN-RESOURCE-MANAGEMENT PROGRAMS AT TECHNICAL UNIVERSITIES AND COLLABORATIVE E-LEARNING PLATFORM UNDER THE PRINCIPLES OF CONSTRUCTIVISM

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Abstract

Constructivism, stressed and valued in the field of education, can enhance students' motivation in learning and their ability to cooperate. Students could also develop their own knowledge with constructive interaction. Because the Internet learning system has the huge function of connecting information and interacting, it can assist learners to approach the idea of learning constructively. The purpose of study is to orient constructivism to the Internet Learning System for students of Human Resource Management of Business Administration in technical universities with the expectation of promoting students' practical abilities for human resource management and team cooperation. A constructivism-oriented e-learning platform is used, with the researchers' aspiration being that students could have higher level of practical working proficiency after learning. A basic teamwork ability scale of students in technical universities, a learning achievement scale of human-resource-management programs, and a learning attitude scale of human-resource-management programs were made under the principles of constructivism, and the researchers verified the reliability and validity of the scales in hope that future researchers could use less time and have a better understanding of disparities between correspondent abilities, learning achievement, and learning attitudes of students before and after the programs.

Introduction

It was said in *Learning: The Treasure Within* (UNESCO, 1996) that people must undergo four dimensions of learning in order to accommodate themselves to possible changes of the society: learning to know, learning to do, learning to live, and learning to be. In an era of knowledge-based economy in the 21st century, qualified human resource has become the most cardinal asset of an enterprise, which contributes to the fact that human resource management is one of the essential elements of the entire organizational management. A well-designed and sophisticated human-resource-management system can help an organization build a long-term irreplaceable competitiveness (Patricia, 2005; Way & Johnson, 2005).

Constructivism-oriented instruction holds that panel discussion and interaction between students with their peer groups or with external members are vital for their understanding information (Susan & Thomas, 1992). In the meantime, oversimplification of erudition is avoided. Constructivism-oriented instruction plays up problem-solving and task accomplishment more than other valuable components of it such as intact real-world knowledge, assorted viewpoints, and crucial open learning environments (Alfred, 2004). In an e-learning environment, people are no longer merely provided with limited time frames or places; instead, they are given multitudinous communicating ways and sundry content formats.

In this regard, this research is aiming at establishing a set of constructivism-oriented digital content of human-resource-management programs which would be applicable for students of the Department of Business Administration in technical universities. Hence, the constructivism-oriented e-learning platform is utilized with researchers' aspiration that students could have higher practical working proficiency after teaching experiments and constructivist learning could be achieved (Wen et al., 2004). The purposes of this study are: 1) to develop digital content of human-resource-management programs and to produce scales of human-resource-management cognition, of effectiveness of psychomotor learning, of effectiveness of affective learning, and of collaborative learning attitudes; and 2) to set up a constructivism-oriented e-learning platform for collaborative learning, with interactivity, which is necessary for distant learning, and all the properties of constructivism as follows.

- Learners can be allowed to take part in the construction of the platform and, therefore, decide inclusion of certain information in accord with their own preferences in the content.
- There should be opportunities that students can communicate and directions to their interaction that they can have a deeper conversation.
- Students can have chance to solve problems during their learning activities.

Constructivism and E-Learning

With a foundation stone of psychology and philosophy of the 20th century, constructivism indicates that learning is a process to put cognition in order. New information should relate to perceived knowledge of learners (Woolfolk, 1993) and, based on this, their personal cognition structure will be innovated or renovated. While learning, a person is more than conceiving new information; he or she is having their knowledge under reconstruction. In spite of the belief of

behaviorists that learners oftentimes mildly accept erudition, they are active information producers from the perspectives of constructivists. Constructivist teaching underlines the complete intact lore in the real world without oversimplifying it, introducing myriad notions and open learning environments, along with an even stronger emphasis on problem-solving and task accomplishment through teamwork. The properties and features of E-learning are valued highly by considerable teaching theorists and scholars. They are convinced that the quality of web-based learning to present and process information corresponds with that of the latest models of cognitive theories, while the knowledge structure of web-based learning resembles that of people, leading to effective learning of pupils. Under this circumstance, scholars recommend that network technologies be utilized to establish constructivist learning environments (Wilson & Jonassen, 1989).

Dorothy (2000) implied that there were three flavors to merge the theory of constructivist learning into the application of e-learning instruction: 1) Instruction was made up for the intention that students could take part in it and organize context which they themselves thought worthy of learning; 2) With Instruction, students ought to be provided with abundant opportunities to communicate with others. When observing interaction among students, educators had to give them vital directions when necessary, which would help them have discussion in depth; 3) Students should be assured chance to conquer predicaments on their own. With e-learning, learners could search for and acquire the learning sources that aroused their curiosity and stimulated their thirst for knowledge. On the other hand, since there was no restriction on places and time periods as to using the service, learners could undergo a colloquy or other interaction with each other, taking advantage of discussion to encounter consistency coordination between information and cognition.

To sum up, it is constructivist teaching that is currently placed in the spotlight in academic area. With constructivist teaching, students may learn more aggressively, cooperate more efficiently, and nourish their own intellect through interaction. Due to numerous available connections with information and interaction provided by an e-learning platform, students could enjoy constructivist learning.

The Standard of E-Learning Content: SCORM

For the time being, with information of learning websites getting more diverse and considerable, ascribing to the extensive development and application of e-learning, people have difficulties integrating and sharing contents constructed according to different standards and methods. Thus, bringing to life a universal switching

standard and method of program management process is one of the core intents of e-learning standards so that contents can be communicable and reusable. In 1997, United States Department of Defense proposed Sharable Content Object Reference Model (SCORM), offering a set of general regulations of establishing and digitalizing contents. SCORM 2004 is a set of regulations mainly of coordinating all existing e-learning contents deemed the reference for a refined SCORM. Therefore, more and more educational institutes invent e-learning platforms congruent with the SCORM standard, having their eye on a significantly adjustable e-learning environment.

Design of Digital Contents: ADDIE Model

The invention of digital contents is a decisive variable in considering whether e-learning is feasible or not at all, whereas the development of contents is relevant to teaching design. Even though e-Learning introduces numerous information technologies, learning is the essence, while digital technology a subordinate instrument. In the field of e-learning, digital contents, for the most part, are still produced based on ADDIE model (Analysis→ Design→ Development→ Implementation→ Evaluation). In truth, this sort of systematic instructional design models are widely applied in academics and development of industrial contents. ADDIE is explained below.

Analysis

During this phase: Pre-Analysis, Learning Content Analysis, Learner Analysis, Learning Objective Analysis, Information Technology Analysis, Delivery Method Analysis, and Budget Analysis will be held.

Design

In the phase of design, there are Timeline, Task Distribution, Standard Establishment, Assessment Approach, Tool Design, Teaching Strategy Design, Interface Design, Procedure Plan, Teaching Management Plan, Storyboard Design, etc.

Development

This is still a preparation phase: Storyboard Design Completion, Storyboard Revision, Content Design Completion, Content Debugging, Content Management, and Content Evaluation.

Implementation

This is when the proposal is being executed with two steps: simultaneous and non-simultaneous steps, inclusive of Educator Training, Assistantship Training, Learner Training, Learning Service Support, Course Extension.

Evaluation

After implementation, people can undertake self-evaluation and estimate course satisfaction such as Learning Achievement Evaluation, Degree of Students' Satisfaction, and Amendment Proposal. What with tests (self-evaluation, online post-training quiz) to understand students' learning achievement, what with questionnaires to perceive how pleased learners are regarding the learning process, the organizers will realize benefits and drawbacks of this model and reform it for future classes accordingly.

Methods

The Methods of Developing Digital Content of Human-Resource-Management Programs Based on Constructivism

Development of scales of learning achievement and learning attitudes of human-resource-management programs. In order to grasp learning achievement of students after the experimental teaching, the researchers generated scales of learning achievement and learning attitudes of human-resource-management programs in technical universities. As soon as the first version of these scales were done, the professionals in the field of human resource management were requested for scrutinizing their suitability, and the scales were amended in accord with their opinions afterwards before the pre-testing scales were fully emended. With the students majoring in human-resource-management programs in technical universities filling up the pre-testing scales, the final scales were brought out after the data of the former were analyzed.

Development of constructivism-oriented digital contents of human-resource-management programs. On the basis of constructivism-orientedness, this study developed contents of human-resource-management programs, which would be utilized in experimental teaching. Employing ADDIE digital content design models — analysis, design, development models — to establish the context of the contents for the programs, this study invented a set of digital contents of human-resource-management programs congruent with SCORM 2004 digital learning standard.

The Methods of Establishing an E-Learning Platform

The platform was mainly developed by programming language PHP, facilitated by Java Servlet, while content package compatible with SCORM 1.2 was allowed to import or export it. Attested by learning environment standard pronounced by United States Department of Defense, the platform was deemed to reach the most supreme standard (e-Learning Center of CCU, 2008).

The following are the system information of it: a) main standard of server hardware: 1. Operating system: FreeBSD 6, Linux kernel 2.4; 2. Character set of the system: zh_TW.UTF-8 ; 3. Database character set: utf8_general_ci ; 4. WWW server : Apache 2, lighttpd, CGI programming language, PHP 5, Smarty template engine 2.6 ; 5. Database: Mysql-server 5; 6. Database package : PEAR-1.4(PEAR DB).

Results and Discussion

There are findings worth summarizing as follows after the past six-month research.

Production of a Learning Achievement Scale of Human-Resource-Management Programs in Technical Universities

The researchers, referring to correspondent books, designed both contents and teaching objectives and made a two-way specification table as a footstone in sight of cognitive abilities — knowledge, comprehension, application, analysis, synthesis, and evaluation, according to Bruner (see Table1) before developing pre-testing scales of the unit, Training and Development, of human-resource-management programs in technical universities. These pre-testing scales were mailed to the professionals for examination, who verified whether or not the questions were in tune with the purpose, the sentences in agreement with fluency, and the content in compliance with the teaching conditions practically. Then the pre-testing scales became viable by reason of these specialized detailed revision and amendment.

Table1: Two-Way Specification Table for Tests of Learning Achievement of Human-resource-management programs.

Number of Questions	Cognitive Levels	Knowledge		Comprehension		Application		Total	
		T/F	MCQ	T/F	MCQ	T/F	MCQ	T/F	MCQ
An Introduction to Human Resource Development		1	1		1		1	1	3
Training and Development			5	3	3		1	3	9
Training Ways		1	2		2		3	1	7
Total		2	8	3	6		5	5	19

* Multiple Choice Question, MCQ; True or False Question, T/F

There were four true or false questions, 17 multiple choice questions, with a value of 0.72 of the overall internal reliability in the official scale.

Production of the Learning Attitude Scale of Human-Resource-Management Programs in Technical Universities

Liking, Anxiety, Confidence, and Usefulness were the four dimensions of the learning attitude scale of human-resource-management programs, each of which had five questions, 20 in total. Likert 5-Point Scale was adopted in this scale, which consisted of both positively and negatively stated questions. For positive ones, “Strongly Disagree” scored one point, “Disagree” two, “Neither Agree or Disagree” three, “Agree” four, and “Strongly Agree” five; vice versa.

The students of Chienkuo Technology Universities and of Hsiuping Institute of Technology who had attended human-resource-management programs were respondents, and the valid data they provided, excluding those from pre-testing questionnaires without complete answers, comprised 218 effective samples, 73 male and 145 female, and were analyzed by SPSS for Windows 13.0.

An assumption test with KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) and Sphericity test of Bartlett were conducted in advance of a factor analysis, which is applicable because, of this research, KMO $0.865 > 0.5$ indicated the high association between variables, and the value of doubling that of Bartlett’s Sphericity test, 4888.397, $p < .001$, showed that there were common factors of the correlation matrices of the variables. During the factor analysis, Orthogonal rotations were implemented with Varimax, and four factors with the eigenvalues more than one were picked. At the same time, questions 3, 10, 11, and 15 are casted aside because the factor loading of them failed to reach 0.4. There were 16 questions in the official scale, presented in Table 2.

Table 2: Factor Analysis Summary of Learning Attitude Scale of Human-Resource-Management Programs

Pre-testing Scale Question	Factor 1: the Degree of Usefulness	Factor 2: the Degree of Liking	Factor 3: the Degree of Anxiety	Factor 4: the Degree of Confidence
6	.622			
7	.865			
8	.842			
9	.787			
12		.691		
13		.692		
14		.850		
16		.574		
17			.619	
18			.837	
19			.757	
20			.492	
1		.		.703
2				.744
4				.725
5				.541
Eigenvalue	5.175	2.471	1.364	1.245
Accumulated Interpretation Variance	32.34%	47.78%	56.31%	64.09%

After the factor analysis, a reliability analysis of Cronbach's Alpha was executed on the retained questions to investigate the consistency of the scales. In so doing, the researchers obtained summary scale reliability (Cronbach's alpha = 0.86); on the other hand, the sub-scales reliabilities: the degree of liking (Cronbach's alpha = 0.78); the degree of anxiety (Cronbach's alpha = 0.75); the degree of usefulness (Cronbach's alpha = 0.88); and the degree of confidence (Cronbach's alpha = 0.75). Thus, this scale was considered sufficiently reliable, since an index value more than 0.70 provided reliability, a reference from perspectives of DeVellis (1991) and Nunnally (1978) (Ming Lung Wu, 1999).

Construction and Test of Constructivism-Oriented E-Learning Platform of Human-Resource-Management Programs in Technical Universities

As soon as the system source codes were downloaded and installed on the server, with system settings completed, the digital programs were established altogether after the researchers constructed contents, assignment, tests, collaborative learning activities, and students' accounts of the programs (see Figures 1 and 2).

Figure 1: Mainpage of the E-Learning Platform



Figure 2: Homepage of the E-Learning Platform

網址: http://elearning.chuh.chc.edu.tw/Course/course.php

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期數 (週)	日期	內容	上課方式	授課教師	教學活動
第1週	2008-9-18	網路學習	chung	1、人力資源發展基本概念、教育訓練程序、人力資源訓練與發展基本概念 2、了解人力資源訓練與發展實施的程序。	
第2週	2008-9-25	網路學習	chung	1、人力資源訓練種類、方法、運用情況 2、說明個案分析方法、教導學生學習個案學習的方式。3、人力資源發展基本概念、教育訓練程序、人力資源訓練與發展基本概念、了解人力資源訓練與發展實施的程序以王品集團個案研討為例，說明個案分析步驟，並且透過小組討論方式利用進一步更瞭解訓練過程。4、小組作業 (一)	
第3週	2008-10-2	網路學習	chung	1、以遠方電子為對象，讓學生發揮創意和團隊合作精神撰寫出適合的教育訓練計畫書 2、線上測驗 (前兩週上課內容) 3、個案研討小組作業討論與分享 (一) 4、鄭林謹說業專訓練個案分享 5、個人作業 (一)	
第4週	2008-10-9	網路學習	chung	以小組為單位，透過團隊合作學習模式，擬定並發表個案公司適合教育訓練企劃書。以正式發表的方式，評量學生於本課程所獲得的知識與能力	

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Scrutinization by the Professionals and Amendment of Constructivism-Oriented Digital Content of Human-Resource-Management Programs in Technical Universities

After the data of the entire programs were settled on the e-learning platform, the professionals in the fields of human resource management and e-learning were invited to assess the programs, applying assessment scales of constructivism-oriented contents and those of design and development phases of ADDIE digital content design model. On top of that, their advice and suggestion were taken into account for amelioration until the digital contents were ultimately constructed.

Development of Constructivism-Oriented E-Learning Contents of Human-Resource-Management Programs in Technical Universities

With respect to the constructivism-oriented systematized teaching model, the content of constructivism-oriented human-resource-management programs which was invented one year ago was further developed and digitalized. The syllabus is shown in Table Four, consisting of six units: Unit One: An Introduction to Human Resource Development; Unit Two: Human Resource Training and Development; Unit Three: Human Resource Training Ways; Unit Four: Relating Project Study and Analysis; Unit Five: Educational Training Plan Making; and Unit Six: Online Test and Project Discussion.

Conclusion

A basic teamwork ability scale of students in technical universities, a learning achievement scale of human-resource-management programs, and a learning attitude scale of human-resource-management programs were made under the principle of constructivism-orientedness. Besides, the researchers verified the reliability and validity of them in hope that people could use less time and have a better understanding of disparities between correspondent abilities, learning achievement, and learning attitudes of students before and after the programs when exercising experimental teaching in the relating fields in years to come. Contributions concerning the construction of the e-learning platform in this study are as follows:

- The content established in this research would be available for future human-resource-management programs in technical universities since, after serious literature review, it was dissected and revised in detail by experts in the fields of both human resource management and Internet-based education. Furthermore, the e-learning platform matches with the SCORM 1.2 standard and, as a result, may be sufficiently applicable for future education given by teachers in the relating areas.

- Conditional online contents were constructed with Flash Action script, offering immense interactivity so that students could face and grapple with virtual problems. Constructivist learning, helping students comprehending virtual problems, would not only instruct them in specialized skills but foster students' habits of and confidence in figuring out answers when confronted with other problems.

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