Web Based Peer Assessment Using Knowledge Acquisition Techniques: Tools for Supporting Contexture Awareness

Chen-Chung Liu, Baw-Jhiune Liu, Tzu-An Hui, *Joring-Tzong Horng
Department of Computer Engineering and Science
Yuan Ze University, Chung-Li, Taiwan
*National Central University, Chung-Li, Taiwan
Email: christia@saturn.yzu.edu.tw

Abstract
Web based peer assessment for portfolios has been used as an innovative assessment methods to reuse students’ portfolio for refining learning. However, without sophisticated support to articulate the assessment contexture about portfolios, students can not communicate with explicit learning concepts and think reflectively for refinement of their learning. This study attempts to utilize knowledge acquisition and data mining techniques to solve the problems in support contexture awareness. By way of knowledge acquisition and data mining techniques, web peer assessment systems obtain students’ personal theories during assessing portfolios. Thereby, teachers and students can go online to fully exchange personal theories, thus allowing them to think reflectively for refinement of learning.

I. Introduction
Web based peer assessment systems implement a convenient assessment communication channel among teachers and student peers for engaging students in reflection thinking. Schon’s conception of reciprocal reflection - in - action has emphasized the way to implement the reflective communication channel[2][6]. Through reflectively communicating with peers and teachers, students critically question the result and process with personal experience. However, without the sophisticated support to articulate the assessment contexture about portfolios, students can not communicate with other peers with explicit learning constructs and think reflectively for progressive refinement of their learning through peer assessment.

Peer assessment generally engages students in comparing and classifying portfolios. Such implementation of assessment is accordance to Luhmann’s “autologie” theory of observation. Autologie implies the self-reflection of a student’s interpretation framework by which students identify distinctions and indication to distinguish various portfolios. Lumann’s conception of contexture elucidates the distinctions and how individual students use these distinctions to assess portfolios. However, students would have different assessment contexture since individual students would pose different distinctions and indications to classify portfolios. Many researches [5] has emphasized the use of Web based peer assessment systems for continuously monitoring of review processes. However, the contexture awareness for monitoring students’ assessment contexture is not well supported in Web based peer assessment systems. Consequently, students and teachers can not easily articulate and compare students’ personal theories [8] of evaluation scheme for enhancing self-reflection during assessment.

Implementing communication with contexture awareness to stimulate reflection entails acquiring evaluators’ conceptualization about portfolios. While using web-based peer assessment systems, teachers and students encounter several difficulties in acquiring such conceptualization.

II. Tasks
This study presents a novel methodology to implement the communication channel to support web peer assessment. The methodology utilizes knowledge acquisition [1] [3] [4] [7] and data mining techniques to solve the problems in support contexture awareness. Knowledge acquisition techniques, termed as also knowledge extraction or knowledge elicitation techniques, are used to transfer and transform problem-solving expertise from a knowledge source to expert system program or knowledge base[3]. Deeply affected by personal construct psychology, knowledge acquisition software such as WebGrid and Enquire Within can facilitate students identify salient concepts by comparing and contrasting portfolios through repertory grid analysis to solve the concept evoking problem.

The web peer assessment system is not only designed for assessment purposes but also as a means
for to promote students’ reflection for refining learning. Engaging students in comparing evaluation concepts between students may help students reflect their approaches from others’ perspectives. Although teachers have given student general evaluation dimensions, students poses personal evaluation concepts according to personal experiences to classify portfolios. For instance, a student may identify a vague concept such as ‘fast searching’ as evaluation concept of the searching methodology dimension while others may identify the concrete concept ‘binary searching’ if this student is capable of using binary searching methodology. Therefore, teachers and students need supports to eliciting students’ evaluation concepts to perceive personal theories and experience.

Students identify evaluation concepts and classify/score others’ portfolios by these evaluation concepts. Therefore, a student assesses another’s portfolio and represents its feature as a vector. Figure 1 displays the assessment result of a student in an assessment group by a Focus analysis methodology [7]. Each column represents the vector of scores of a student’s portfolio in each evaluation concept.

Figure 1: The concepts and conceptual framework using knowledge acquisition techniques

Figure 2: Eliciting assessment contexture with knowledge acquisition techniques

Figure 2 illustrates how knowledge acquisition techniques are used to obtain students’ evaluation concepts, conceptual framework, and evaluation scheme. Students initially develop learning portfolios in the web learning system. Meanwhile, the web peer assessment system automatically dispatches students’ portfolios to students. The system provides an interactive manner for students to evaluate portfolios. Triadic portfolio analysis is applied herein to elicit students’ repertory grids. The repertory grids represent students’ personal concepts and evaluation of portfolios. The grids enable the system to automatically probe students’ conceptual framework and evaluation scheme. The cluster analysis tools automatically clusters portfolios according to elicited concepts. The cluster analysis displays the relationship among portfolios and concepts with similarity among them. Meanwhile, decision tree software discovers how students reach the decision to mark the final score of portfolios. Therefore, students and teachers can go online to exchanging personal conceptual structure, and hence, enhance self-reflection to refine learning.

References