

Ontology based Competency Matching between Vocational Education and the Workplace

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Introduction

The field of personnel selection has its roots in the notion that a candidates' future job performance in a particular position may be predicted at the time of selection on the basis of relatively enduring and stable characteristics of that candidate. Students finishing their studies at various levels of vocational education have to go through the organization's Prior Learning Assessment, in which previous experience and qualifications are evaluated – in our approach with the help of ontologies – against entry requirements (skills and competencies) for the job role. This research has been carried out within the OntoHR Project (www.ontohr.eu).

Significant problems in the field

Inferences that are made in personnel selection research can be classified into three approaches towards establishing the validity of predictor measures, namely 1) content-related; 2) criterion-related; and 3) construct-related approach (Binning & Barrett, 1989). Rather than attempting to assess the job performance domain in its entirety, either a predictor or a criterion measure is used to sample the performance domain. At the same time broad educational qualifications are too crude for purposes of personnel selection. Therefore such specific qualification to job matching should be created that can also tackle with the conversion of vocational education qualifications into job related competencies. An even more comprehensive problem related to this research field is structural unemployment. Such solutions should be worked out that enable unemployed people to target their learning efforts in order to regain employment. Furthermore there is a projected European workforce shortage in the target sector of this proposal (IT related professions), and due to this shortage competency matching will be very important in the future.

State of the art

At first the work of Binning and Barrett (1989) must be analyzed in order to explore the origin of nowadays' recruitment and selection theory foundations. That should be followed by the key components of competency-based recruitment and selection itself: the process and its effects are both relevant concerning our research (Dubois & Rothwell, 2004). The field of competency management is also closely related to the proposed research: accordingly features of competencies, competency management and job-role design were also analyzed. Finally ontology should be introduced and also the means it can contribute to the work with competencies and recruitment (Mochol et al., 2004; Schmidt & Kunzmann, 2006).

Research question

There are two main hypotheses what we intend to investigate in detail:

Hypothesis 1: It is possible to build up an Ontology based personnel decision making system which can be employed to provide support for the inferences pertaining to the construct-, content- and criterion-related validity approaches that are described by Binning and Barrett (1989). Our aim is to build an information system, which can sample the skills, competencies and knowledge of an existing employee or an applicant. Based on this sampling we give an evaluation whether the selected individual meets the criteria of a given job profile. The Binning and Barrett model also demonstrates a sampling mixture, which enables the predictor to facilitate decision making about an employment contract. These measures can be described by knowledge and competencies, which – as will be elucidated below – are also part of the educational ontology. We believe that a modified educational ontology (Vas, 2007) based information system can generate support for the inferences described in the above model.

Hypothesis 2, Job roles can be described by a Job-Role Ontology and applied by Organisations. A Job-role is a set of personality, skills, competencies and factual knowledge. These items can be formalised and interpreted in an explicit way – e.g. job descriptions. We strongly support the idea of creating an organisational view of these sets with their descriptions, interdependencies and 'cause and effect' relations, which can be plotted by an ontology. Therefore as a part of this research a Job role will be chosen at a corporation, where the job

specific constructs will be incorporated to and tested in a job specific ontology.

Methodology

This research aims at creating more specific qualification to job matching, with the overriding purpose of tackling the conversion of vocational education qualifications into job related competencies. To facilitate this, an ontology supported selection and training system will be built in line with relevant HRM and Knowledge Management theories (Draganidis & Mentzas, 2006; Guarino, 1998; Mochol et al., 2004; Ones & Viswesvaran, 1996; Tijdens, 2010), employing existing educational technologies such as content management systems and adaptive testing. This eLearning interface will be able to: i) map qualifications in vocational education to current and valid job roles; ii) test and evaluate students on the basis of valid, labour market driven competencies; iii) identify missing competencies and provide learning content needed to acquire them; iv) address the weaknesses of particular VET curricula, and thereby provide ad-hoc support.

Results achieved so far

Having discussed some of the defining characteristics of competencies, we also examined how competencies may be compared and contrasted with a number of related terms that are also highly relevant to the research. These are job performance, cognitive ability, personality, and knowledge. During the first year the following activities have been carried out: i) state of art analysis of current ontology based educational, selection and recruitment processes; ii) a job-role has been selected and analysed both in the Netherlands and Italy; and the competency profile of this job-role has been set up; iii) the model of job-role and VET ontologies have been set up.

Innovative aspects of the solution

Although a handful of ontology based systems have been successfully implemented both within the fields of HRM and education, the readily apparent desirability of bridging the vocational education – workplace divide, by means of interconnected VET and domain ontologies as outlined here, is unique. Filling this increasingly conspicuous research gap may in due time put an end to the arduous process of first testing

students to allow them to successfully exit vocational education, only to test them again upon organizational entry. Indeed in due time, we foresee that this technology might further facilitate the blurring of vocational education to workplace boundaries, by allowing the adequate and accurate measurement of time to proficiency in a particular occupation, while at the same time continuing the delivery of training content that is tailored to the needs of the individual student.

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