Chapter 5.21
Formative Assessment and Certification in Lifelong Learning with Cognitive and Metacognitive Measurements

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ABSTRACT

Traditional forms of assessment used in face-to-face and distance learning education are insufficient to ascertain the increase of the knowledge acquired and the learners progress, therefore do not provide enough information to detect their learning gaps necessary to improve their competencies. Another point is that traditional assessment ways rarely involve the student in monitoring his own learning through his metacognitive abilities. Nowadays, professional skills to obtain a working position changes at the same velocity than the increase of knowledge and have to be considered by any professional and/or student to be qualified for a new job. This paper presents a model for formative assessment and certification in Lifelong Learning based on cognitive and metacognitive measurements that will make possible the identification of the professional learning gaps showing a roadmap to obtain educational and conceptual certification for his/her competence. Moreover, it presents the architecture of a computational environment for student knowledge mapping that will allow identifying more specifically the learning gaps in order to supply the educational system with qualitative information.

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INTRODUCTION

The rapid technological development and the growing changes in the profiles of professionals required to act in any area, in particular the area of IT, have taken people to seek ever more new capacities, by the other side Educational Institutions have sought to offer a lot of different types of courses and modes of learning for the maintenance and improvement of skill levels of these professionals called Longlife Learning.

Evaluate people, choosing training or its complement to obtain a good job placement involves many complexities. The combination of factors is very large, resulting in a number of personal profiles, almost infinite, and very difficult to compare.

The assessment process plays an important role in producing information that can help students and professionals, parents, teachers and educational administrators to know and deal better with the learning gaps. Teachers and the Intelligent Tutoring Systems (ITS) can use this information to adapt the instruction to the student's learning needs and difficulties and to work as guidelines to his/her formation.

The Assessment Reform Group (1999) based on their research stands that successful learning occurs when learners have ownership of their learning; when they understand the goals they are aiming for; when, crucially, they are motivated and have the skills to achieve success. Not only are these essential features of effective day-to-day learning in the classroom, they are key ingredients of successful Lifelong Learning.

Another important aspect in the learning process relates to the student's metacognitive abilities, *i.e.*, the process of reflecting about the own knowledge which Flavell (1979) called metacognition. Knowledge about knowledge itself is very important to the learning with quality.

Many teachers rely on a traditional, pre-test and pos-test design to document student progress as showed by Shepard (2001). Pretest results are used to establish each students' achievement level or location but are typically not used to gain insight into the nature of student's understanding, e.g., when a problem is missed, it is not known what partial knowledge or competing conception is at work. Moreover, to develop students' metacognitive knowledge about what helps in their own learning, there might be explicit discussion of both the facilitating and inhibiting effects of background knowledge.

The ongoing assessment that aims to diagnose and to improve the learning instead of merely classify the students is basic in distance learning education to increase the adaptability of the systems and the personalization of the education, increasing the motivation and reducing the evasion rate, besides increasing the quality and productivity of the learning. Moreover, it can help to minimize the problems of credibility lack on who effectively took the assessment, allowing monitoring the evolution of the learning instead of having only one measure at the end of the course. In distance learning education the majority of computational environments involves some kind of ongoing student assessment, in which observation is based on documentation of the student's interactions with the environment as showed by Silva and Vieira (2001).

This paper presents a model for formative assessment and certification in Longlife Learning based on cognitive and metacognitive measurements that will make possible the identification of the professional or student learning gaps. Moreover, it presents the architecture of a computational environment to implement the proposed model.

The model will support the monitoring and the development of metacognitive processes in order to allow the person to have control of his/her own learning through the process of self-regulation, which is self-monitoring, self-evaluation, and self-reinforcement. As a cognitive measurer this paper will propose the Knowledge Acquisition Level (KAL) obtained for each item of the knowledge domain, making possible the identification of