Modelling the Virtual Company Educational Scenario Competence Assessment in the Cooper environment

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Abstract. The Virtual Company educational scenario engages students in a professional setting for working and learning. Students are enabled to develop competencies that are derived from professional practice. This allows us to use assessment strategies that are different from the practice in traditional educational settings. In the Virtual Company educational scenario the competence assessment procedure starts from the moment a student has a job interview. Students in a Virtual Company are considered starting professionals and are expected to perform as such in adopting an active role in the competency assessment procedures. In order to implement the Virtual Company educational scenario assessment strategy in the Cooper project centred collaborative working environment we developed an assessment module that is closely linked to the Virtual Company educational scenario. In this article, we report on the modelling of the assessment process and its integration into the Cooper collaboration environment.

Keywords: competence assessment, virtual company, workflow, CSCL .

1. Introduction

In the Virtual Company educational scenario students are enabled to learn and work at the same time. Its main goal is to bridge the gap between traditional education and

professional practice [5, 6]. In order to achieve this objective, a Virtual Company is modelled after a real company in a certain knowledge domain. In it, students perform in project teams whose tasks are acquired from real customers. The collaborative working processes are aimed at developing students into reflective practitioners [2]. Personal and team competence assessment are conceived as integral part of project work, so during planned review sessions assessments are performed. The competence assessment is partly based on a competence list derived from professional practise and partly on a more generic list of interpersonal skills. From these lists, students choose competences to work on. They also define the personal and team performance indicators they want to be assessed by. Reflection reports on work related actions are drafted based on the feedback received from fellow students. These reflection reports, taken together with the feedback received from the project coach and the customer (on the quality of the team products and the communication between the project team and the customer) serve as a basis for the intermediate and final assessments of the individuals and team performance.

In this article we report on the modelling of the Virtual Company assessment process and the subsequent implementation of the resulting assessment model into the Cooper environment. The Cooper collaborative environment is developed with the use of a state of the art dynamic workflow tool called WebRatio [9]. This tool enables us to model all Virtual Company processes, including the assessment strategy. The Cooper environment consists of modules that can be joined together to form a collaborative environment, based on a shared data model. When students use the Cooper environment, one of their tasks is to define their own work processes, including moments for project review and assessment. The Cooper assessment module will allows students to apply for a job, choose a project they want to work in, state the competencies they prefer to (further) develop, create a personal development plan, draft a project work plan to work by as a team on a real task. The assessment module will complement the already available Cooper modules that support users in creating their own work processes, sharing documents, having internet based voice chat, using discussion fora etc.

2. The Virtual Company educational scenario

The Virtual Company (VC) educational scenario supports the assessment of working and learning processes on the levels of the individuals, the teams and the organization in which they operate. The results of these assessments are fed back into different levels of the organization, allowing for adaptation in work processes and other aspects of the organization [11]. In the VC educational design this is implemented by having students fulfil a project role in the processes in the Virtual Company. In that role, they handle ill-structured problems from real clients in a real, but virtualized, company in order to expand their (collective) expertise in a professional setting. In doing so, they develop expertise by personal learning, team learning, organizational learning, knowledge management and the development of organizational competencies [5, 6].

The Virtual Company educational scenario provides students with a business context in which projects are performed. Three project phases are distinguished: 1) Project start: students apply for jobs, and state learning goals in a personal development plan, the coach defines teams based on available projects and student preferences; 2) Project execution: based on a project work plan students perform the project in a team, but also work on personal learning goals; 3) Project end: project results are delivered to the customer and the Virtual Company (in the shape of lessons learned reports).

Furthermore, in the project execution phase, the scenario discerns the following learning cycles: The personal development cycle, the team development cycle and the company development cycle. These development cycles are depicted in figures 1,2 and 3. A description of the figures is offered below.

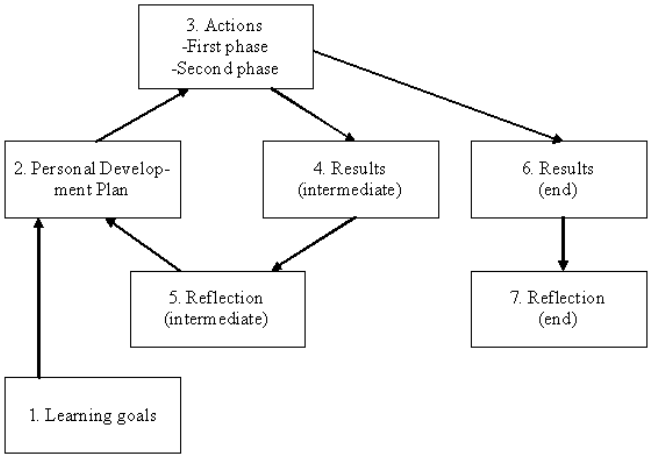

Figure 1: Personal development cycle

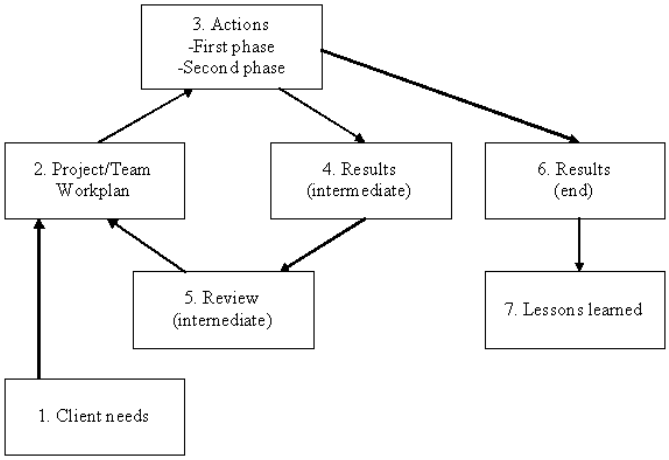

Figure 2: Team development cycle

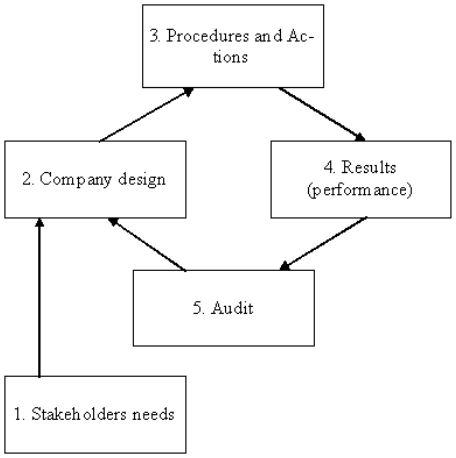

Figure 3: Company development cycle

Activities depicted in figures 1 and 2 are:

1. The individual learning goals are defined, taking into account possible learning opportunities in the client needs;
2. A personal development plan is made, in conjunction with the team work plan;
3. Actions are performed, based on the initial personal development plan as well as on the team project plan;

4. Results are delivered to the customer and the Virtual Company;
5. Reflections on both personal performance and team performance may lead to adjustments in the personal development and project work plan, and so leading to changes in the actions to be performed;
6. The project end result is delivered;
7. Final personal and team reflections on product and process are phrased; lessons learned are made available to other project teams and the company to reflect on.

Activities depicted in figure 3 are:

1. An analysis of stakeholders needs is performed;
2. A company is designed to meet those needs;
3. Procedures and actions are defined that will guide performance and quality;
4. Results are achieved by workers following procedures.
5. Audits are organised to review the envisioned company/actions/results in relation to the stakeholder's needs and performance standards.

3. Competence assessment in the Virtual Company education scenario

Anderson [7] analyses some characteristics exhibited by traditional assessment models. Traditional assessment: 1) Assumes knowledge has universal meaning; 2) Treats learning as a passive process; 3) Separates process from product; 4) Focuses on mastering discrete, isolated bits of information; 5) Assumes the purpose of assessment is to document learning; 6) Believes that cognitive abilities are separate from affective abilities; 7) Views assessment as objective, value-free, and neutral; 8) Embraces a hierarchical model of power and control; 9) Perceives learning as an individual enterprise.

However, when we compare these characteristics to some of the characteristics of Virtual Company educational scenario it becomes clear traditional assessment models do not fit (the numbers in the text relate to the opposing characteristics described above):

Already at the intake of students, the Virtual Company takes into account the ability and wishes of a student to perform a task, also addressing personal preference etc. besides (prior) knowledge (1, 6). In the Virtual Company educational scenario, individual students are responsible for defining their own performance criteria, in relation to the project task at hand and their personal competence growth wishes (2, 3, 4). This design transfers the "ownership" over the assessment criteria from the teacher to the student, resulting in increased student involvement (8). Students work in teams that also define their performance criteria as a team (9). Aimed at improving performance (5), assessment is carried out during project reviews by team members among themselves and by a project coach and the customer (7).

So, in order to align assessment with the learning and working process in a Virtual Company, a more fitting competence assessment implementation is needed.

Fletcher [10] distinguishes between the following stages in the process of competence assessment:

1. State required criteria for performance (What are the required outcomes of individual performance?);
2. Collect evidence of outcomes of individual performances;
3. Match evidence to specified outcomes;
4. Make judgments regarding achievement of all required performance outcomes;
5. Allocate 'competent' or 'not yet competent' rating;
6. If purpose of assessment is certification: Issue certificate(s) for achieved competence ;
7. Plan development for areas in which 'not yet competent' decision has been made.

As the Virtual Company educational scenario also includes the concept of team performance assessment, we propose the following augmentations to these stages:

1. State required criteria for performance (What are the required outcomes of individual and team performance?);
2. Collect evidence of outcomes of individual and teams performances;
3. Match evidence to specified outcomes;
4. Make judgments regarding achievement of all required performance outcomes;
5. Allocate 'competent' or 'not yet competent' rating;
6. If purpose of assessment is certification: Issue certificate(s) for achieved competence;
7. Plan development for areas in which 'not yet competent' decision has been made.

In the Virtual Company educational scenario these stages can be recognized in the following actions students or teams perform: 1) The students and their project teams describe their performance criteria, guided by a competence list that describes competencies that can be developed by working in the domain the Virtual Company is modelled in; 2) Individuals and teams collect evidence about their performance by personal and team reflection and by gathering feedback from their project coach and the customer; 3) In a review cycle, the personal and team reflections, combined with the feedback from coach and customer are compared with the performance criteria and projected results defined at the onset of the project; 4) The project coach judges progress and suggests improvements; 5) The results of feedback on personal and team performance are published; 6) If a "not yet competent" decision is reached, adjustments are made to the personal and team development plan, including competencies to be worked on. These are then assessed again at the next project review; 7) A final assessment is made at the end of the project.

However, as a result of the design of the project phase in the Virtual Company scenario in which multiple assessment and review cycles can be planned (thus postponing the moment of final assessment) we reversed the phases 6 and 7 from Fletcher's original design.

4. Implementing the Virtual Company Competence Assessment in the Cooper collaborative environment

The Cooper EU project [1] addresses the problem of supporting long-distance collaboration of teams working on complex projects, assuming that the team members and coaches are geographically dispersed and have heterogeneous backgrounds and competencies. Cooper is a collaborative environment delivered on the Web, which is able to support individual and collective activities in teams. An important Cooper goal is to develop a reference model for teamwork collaboration processes, which enables the management of flexible processes that can be defined by users at runtime to accommodate their collaboration needs. This model also guides the development of a software platform that is capable of integrating flexible collaboration processes with educational scenarios and tools enabling cooperation.

In order to implement the Virtual Company's competence assessment in the Cooper environment, the assessment procedure workflow was modelled as is shown in figures 4 a, b, and c.

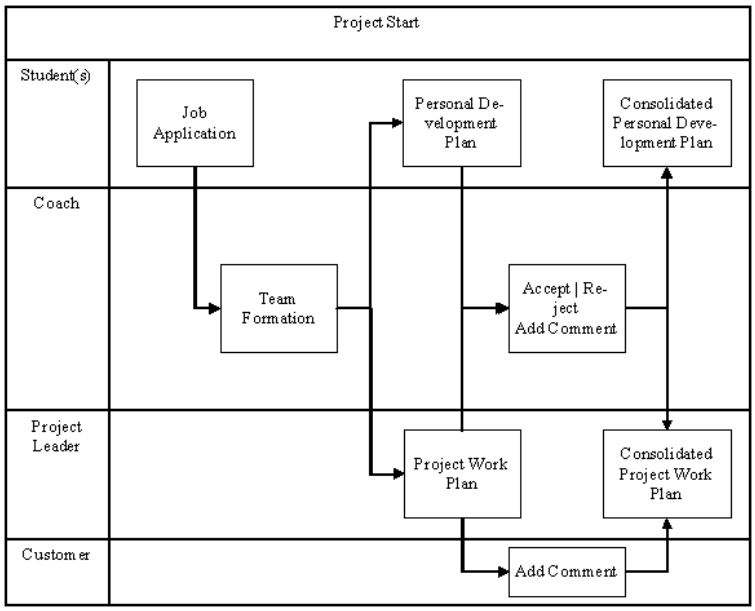

Figure 4a: Assessment related activities at the project start phase

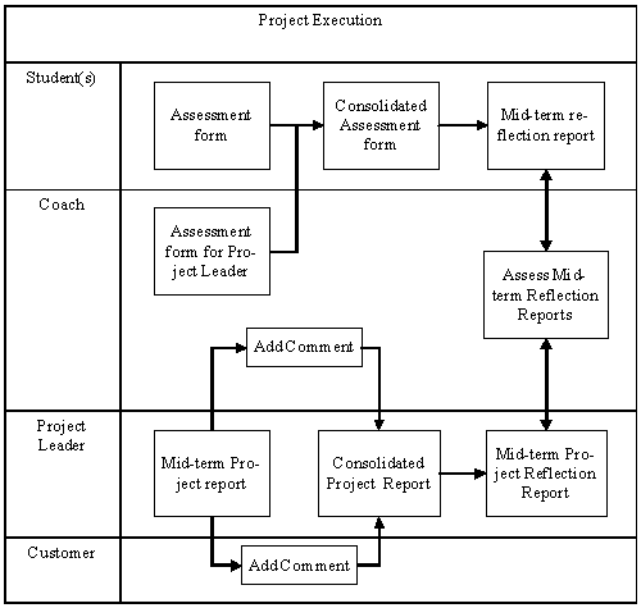

Figure 4b: Assessment related activities at the project execution phase

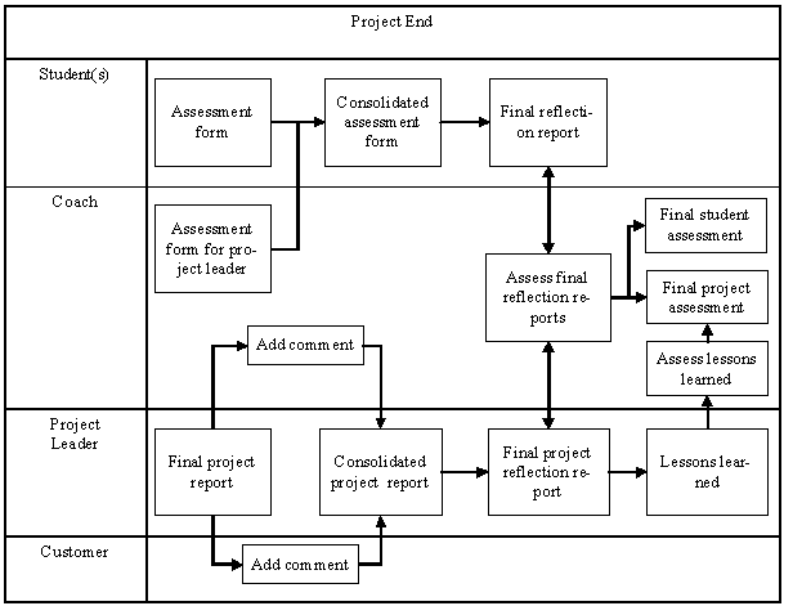

Figure 4c: Assessment related activities at the project end phase

Figures 4a, b, and c show the sequence of actions related to assessment users in a certain role perform in the Virtual Company.

5. Modelling the competence assessment module in Cooper

The module responsible for the implementation of the assessment process is built using Web Markup Language [8] and WebRatio [9], which is a Computer Aided Software Engineering (CASE) tool for developing data intensive applications based on Web Markup Language. The assessment module extends the common database schema already available for the Cooper platform. It connects to and extends a large number of database tables like "User" or "Project". Some of these entities are shown in figure 5.

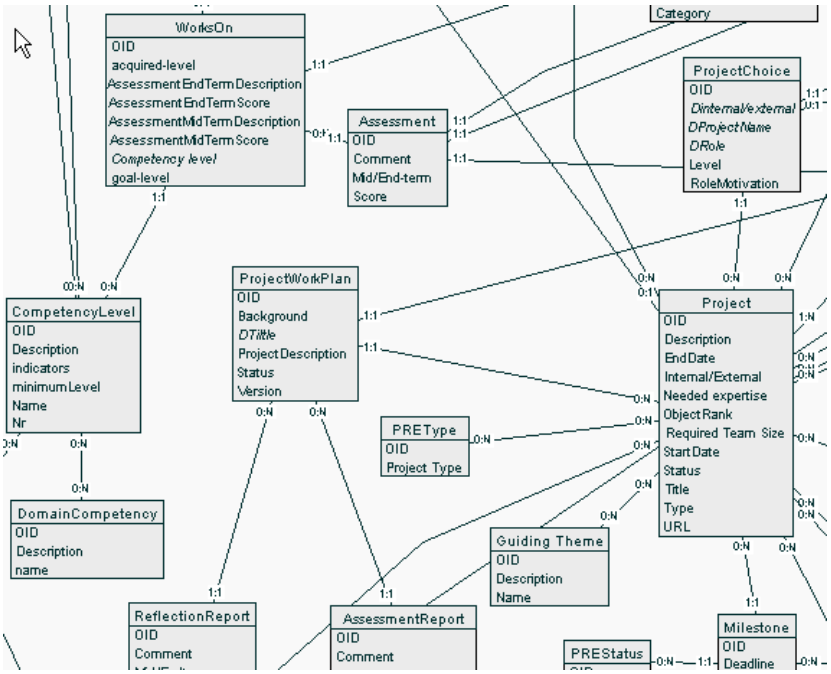

Figure 5: Part of the Cooper data model related to assessment

The implementation of the assessment module is divided into two distinct parts in WebRatio [9]: 1) the data and workflow modelling part and 2) the design of the web pages for gathering inputs and presenting data.

The assessment related database model additions represent the items related to assessment, like the competency list or the list of available projects. These items show up on the job application form, in which the student chooses competencies to work on and

indicates which projects s/he wishes to be part of. This information is used by the coach to create teams and assign students to a role (team member or project leader). The team members and project leader then use the personal development plan page (on which the competencies chosen in the job application form appear) to describe which actions they are going to undertake un the project to develop their competencies, including the performance indicators used to assess progress. The project leader also supervises the draft of a project work plan. On both the personal development plan and the project work plan comments are gathered from the coach, which are used to improve the plans until they are accepted by the coach. The customer also delivers input on the project work plan, and has to agree to the final version (also see figure 4 a).

After this, the actual project work begins and students perform the actions agreed upon in the project work plan. Part of the plan are reflection and review moments (see figures 1 and 2), aimed at accessing and improving the personal and project results. The Cooper environment, using an external web service, creates an assessment schedule that appears in the students to-do list. Students fill out the assessment page for at least two other students, while the coach always also assesses the project leader. The assessment page shows the competencies the student assessed has chosen and the actions the student agreed to take on those competencies, including indicators to guide the assessor in his/her assessment. Once the assessments have been completed, each team member is presented with the assessment results and comments. Based on these results, each team member writes up a reflection report in which s/he describes which actions s/he is going to undertake to improve his/her performance in the next project cycle. On the project level, an interim project report is drafted and put before the coach and customer to comment on. These comments are incorporated into to project report that has to be agreed upon by the coach and customers. After that, the team drafts a project reflection report describing action to take to improve the project results (see figure 4 b). The personal reflection reports and the project reflection report are assessed by the coach.

At the end of the project a second assessment is performed comparable to the first assessment. One difference although is that the team also draws up a lessons learned report. This report is part of the knowledge management processes in the company and will be available to other (future) project teams and to the company to be use as base for improvements in the company design. At the end of the student' stay in the Virtual Company the coach formally assesses the student reflection reports, the project reflection report and the lessons learned report to come to a final personal assessment based on the criteria laid down by the (educational) institution.

The implementation of the assessment procedure is currently available as a prototype only. Testing with students has not yet been done.

6. Conclusions

The Virtual Company educational scenario requires an assessment strategy different from traditional assessment. The personal involvement in defining assessment criteria and the multiple sources for feedback on personal and team performance result in an

assessment of competencies of individual students and teams that corresponds to assessment in business practice. The proposed assessment workflow model covers the assessment processes required. The WebRatio modelling tool on which the Cooper collaborative environment is based can be used to define the underlying database model and represent the process model of the competence assessment strategy of the Virtual Company scenario. Almost all of the required data processing can occur inside the Cooper environment. Testing the assessment approach in the Cooper environment would contribute to the validation of the assessment concept.

7. Acknowledgments

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