Developing a Software Tools for Nontraditional Methods of Assessment

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Abstract: *In this paper we present the main components of the first version of TENCompetence Assessment Specification, and give examples how the model can be used in practice. For this reason several proof-of-concept software tools were designed and developed, aiming to show how we can apply the TENCompetence Assessment Model for the implementation of different assessment methods like 360 degree feedback, portfolio assessment and peer assessment.*

Keywords: *360 degree feedback, assessment model, lifelong competence development, portfolio assessment.*

1.INTRODUCTION

The European Network for Lifelong Competence Development (TENCompetence) project aims to develop and integrate new pedagogical and organizational models for lifelong competence development and to build an European 'Infrastructure' based on integrated open source components and standards-based technology [1].

The TENCompetence Assessment Model aims to cover the life-cycle of the assessment process. The model aims to give the possibility to implement various assessment techniques which allow development and design of assessments that are specific to competence development [3].

It is described as a formal specification using UML diagrams for preparing all blueprints of the model. Unified Modeling Language (UML) is an industry standardized "graphical language for visualizing, specifying, constructing, and documenting the artifacts of a software-intensive system" [4].

The model is built on several sub-models, each matching a different stage in the assessment process. According to the Assessment model there are five main packages which describe all the functionalities of the assessment process.

The Assessment Design stage defines Assessment Plan which is a complex object containing different factors and guidelines from the pedagogical model of the assessment. The Assessment Plan focuses on specific traits of the individual person(s) or group(s) which are assigned to it, by using the decision rule as well as specific assessment policy which has to be followed.

In core of the second packages (Item Construction) stays the Item which could be of different type: construction, selection and demonstration. For the proper description of the functionality of the Item, the following components are used: Prompt, Case text, Hint and Feedback.

In the Assessment Construction package the output is the Unit of Assessment which consists of one or more Items according to the Assessment Plan. It defines the type and value of the Scale which specifies how the candidate's response has to be translated into a score.

The Assessment Run package is the process where the candidate undertakes an assessment and his/her answers are recorded in the ItemResponse for every single Item. There are two main objects: AssessmentTake and ItemResponse.

In the Response Processing package the main object is Assessor. It is responsible for two major steps: to transform the candidate's response, represent as Item Response in the model, into a rubric score using the defined transformation rules and to calculate the Assessment Idicator Score for each candidate.

2.REFERENCE IMPLEMENTATION OF TENCOMPETENCE ASSESSMENT MODEL

The 360 degree assessment includes several steps: analyzing the organization (learning network), preparing the members in the assessment procedure, developing the questionnaires and conducting surveys, analyzing the results and preparing reports, One-to-one meetings to give feedback to users and to plan further activities, with possible re-assessment afterwards.

This reference implementation aims to demonstrate how these steps will be described in TENCompetence Assessment Model.

The 360-degree feedback is a questionnaire-based diagnostic method. So the Item Construction Phase is one of the most important, when well-designed questionnaires have to be developed. The Items could be of the Selection Item form, in one of the follow types like multi-choice, multi-response question or open question related to different competencies. Some questionnaires include a free-written section in which other observations or comments may be made. This can help to throw more light on the ratings, but again the person giving the feedback needs to be sensitive in managing this information.

In the context of the 360 degree method, the Unit of asssessment is formed by choosing and incorporating appropriate questions, which are called Assessment Items in the Assessment Model, which are forming the 360 Degree questionnaire.

As a general rule, the number of questions may depend on what the feedback is used for. If the assessment is used for individual development, the survey should be brief—usually no more than 50 questions. Most organizations focus on core competencies or key areas, thereby reducing the number of areas for feedback.

It is important to define the appropriate Scale which could be numeric or nonnumeric scale. Most 360 degree assessments use four different types of rating scales: effectiveness; potential; ranking and frequency.

Effectiveness scales ask participants to provide judgments about how "effective" the individual demonstrates specific competencies and underlying behaviors. Potential scales are more commonly used for succession planning systems and ask raters to predict how well the participant might perform in the future or what potential they have to succeed. Ranking scales typically ask participants to compare to some type of standard. For example, evaluate the person assessed compared to the most effective leader that

he/she has experienced within their organization. Frequency scales typically ask about how often the person assessed has demonstrated or expressed specific behaviors.

A questionnaire used for 360 Degree Feedback typically contains statements that are rated on least seven rating options, and a ten-point scale provides for an even greater spread of responses which is example of numeric scale.

The nonnumeric scale could describe as follow: the ratings of the different groups are presented separately, and the range of the ratings (i.e. highest and lowest) as well as the averages included so that these differences in perspective are identified. If there are enough raters involved, this should not compromise anonymity. The feedback should also be reviewed for sensitivity in how the information on the ratings is presented and in particular how the implications of lower ratings are conveyed.

In the Assessment Run stage of assessment process it could describe the follow main objects. The candidate receives an on-line or other kind form in order to fill it. In terms of assesmnet model it is Assessment Take object. The object Item Response was collected for items that fall under a specific dimension of job performance. A single questionnaire may contain dozens of questions that measure responses on one or more dimensions. For example Communication Items measure the ability to present information formally and informally in both written and orally. Also measures the ability to communicate with customers, staff, peers and supervisors.

Assessmnet model's objects person or group would be eight to ten raters for each rater group invited to participate to maximize accuracy of the feedback. Limited research is available to guide decisions on the optimum number of raters necessary to increase validity of 360 feedback results.

The Assessor in this method is used for providing the individual gap analysis reports, which identify the candidate for each behavioural indicator. These ratings are compared with both the target rating and the average rating of all others who have self-assessed against the same competence. Results are displayed graphically for each question, detailing the self-rating, the target rating and the average rating of other users. A similar graphic is shown to demonstrate the rolled-up ratings for each competency.

3.CURRENT STATE OF THE TOOLS

The purpose of these tools is to show how it can be used to implement different assessment methods. It is necessary to demonstrate the feasibility of modeling both classic and new forms of assessment based on TENCompetence assessment specification, and of mapping the output of the tool into IMS LD and IMS QTI documents automatically.

We choose to apply the model for two such methods: 360 degree feedback and portfolio assessment.
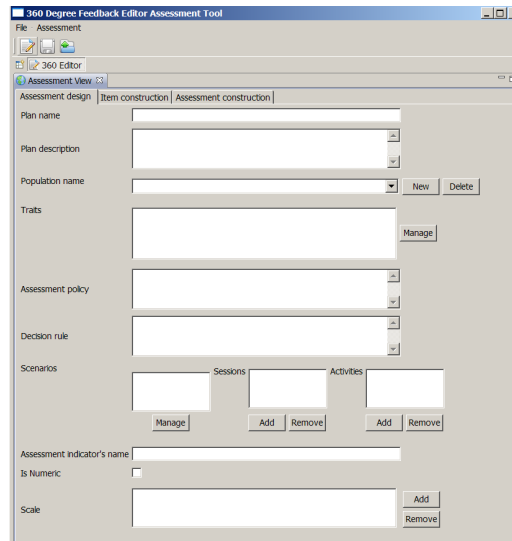
Fig. 1: 360 degree feedback tool

The first tool is called Assessment Authoring editor (fig. 1). It covers the following three phases of TENCompetence Assessment Model: Assessment design, Item construction and Assessment construction. This editor was used in the implementation of the 360 degree feedback assessment method. This method is used to measure an individual's performance by contrasting people's own self-assessment with the assessment done by other people.

This assessment method uses questionnaires, which are developed and adapted for each individual participant. Each participant has to fill her/his own questionnaire, all filled questionnaires are compiled and analysed together, and after that assessment report is prepared.

The second tool is called Run-time assessment tool amd it was used to implement Portfolio assessment method.

A portfolio is a method of assessment which purposeful collection of person's works that presents efforts, progress, and achievements, as well as demonstrates personal growth in one or more areas of the curriculum and jobs over time.
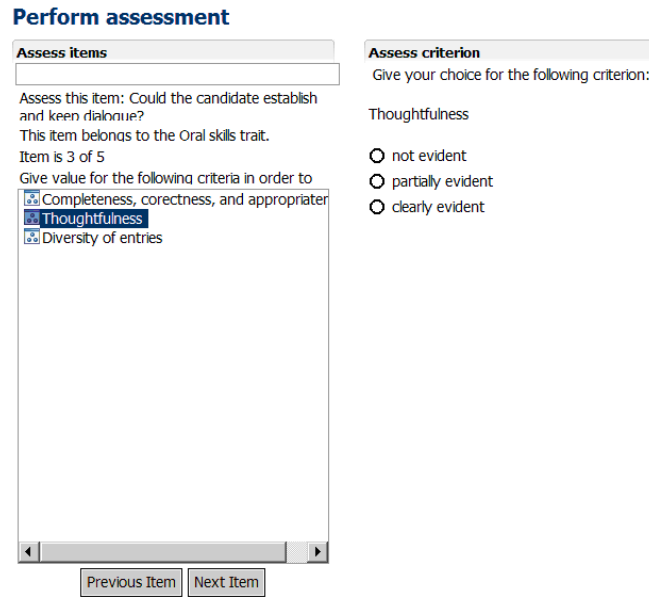
Fig. 2: Portfolio assessment tool

The developing tool offers functionalities like portfolio assessment, portfolio editing, portfolio export and import, media player. There are seven sections in the portfolio structure: degrees, informal learning, competence (skills), work samples, experiences, anecdote observation and goals. Fig. 2 shows the user interface of perform assessment and fig. 3 activity diagram.
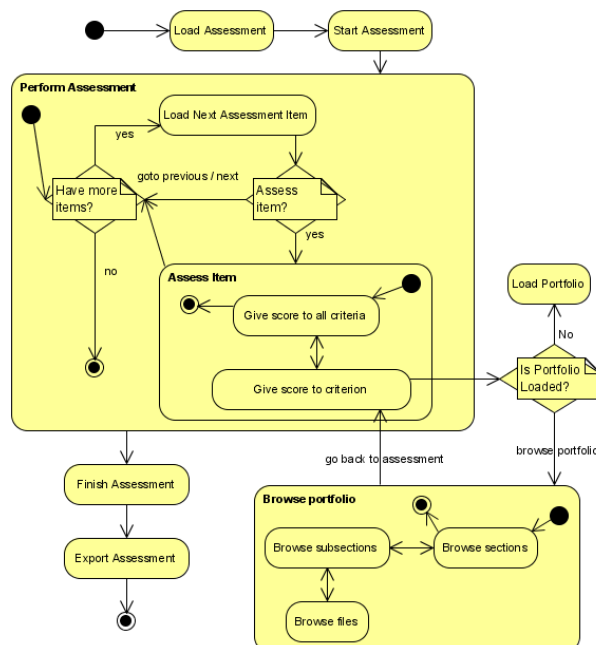
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Fig. 3: Activity diagram of assessment performance

Both tools were developed as a Java Eclipse-based plug-in framework. Eclipse is the target platform for the TENCompetence and supports a powerful plug-in architecture. It is an extensible platform that provides a core of services that work together to

support various tasks. The basic mechanism of extensibility in Eclipse is that new plug-ins can add new processing elements to existing plug-ins.

4.CONCLUSIONS

One of the goals of the TENCompetence project is to offer new assessment methodology for competences. As a result of the research in this direction so far, it was developed a formal assessment specification and a corresponding assessment author-ing tool to support ordinary practitioners in designing and customizing assessments. These include new forms of assessment as well as the classic forms of assessment, which are covered by IMS Question and Test Interoperability Specification.

The main point of this paper was to present the software tools which work with as-sessment model.

Experiences from the tools development have indicated that the main problem to be resolved is a conflict between document-centric and activity-centric models. The as-sessment model, like IMS QTI, specifies a data model for the representation of assess-ment item, assessment test, and results reports.

5.ACKNOWLEDGMENTS

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