Title: Method and System for Skills Assessment, Improvement and Re-evaluation

Inventors: Kim Adolphe, Dana Baillie, David Burns

Assignee: Gemini Performance Solutions Inc. (renamed SWIFT Learning in 2003)

Abstract: The invention comprises a system and method for assessing and improving skills that assesses skill levels, at both the individual and organization level, and then reassesses these levels by using an adaptive post-assessment that targets only the required skill improvement opportunities identified in the initial assessment. Assessments are groups of multiple-choice questions in a hierarchical structure. This structure, together with the weighted response options for each question make up the skills model against which assessments are made. Desired skill levels together with related improvement opportunities (learning events) for those who are assessed below these levels are specified for each part of the skill model. Post-intervention assessments are developed for each participant upon completion of the initial assessment. These post-intervention assessments target only parts of the skill model identified for the individual as being improvement opportunities. Comparative reports are generated to show improvements from pre-assessment through post-intervention assessment.

Claims:

1. A method for skills assessment comprising the steps of:
    a. constructing a two level hierarchical skills model comprised of multiple-choice questions with weighted response options and related improvement opportunities
    b. initially assessing participants through their responses to these questions
    c. generating individualized improvement plans for each assessment participant
    d. generating individualized re-assessments targeting the parts of the skills model identified as improvement opportunities.

2. The method for skills assessment according to claim 1, wherein the improvement opportunities are specified, optionally, at each part of the skill model.

3. The method for skills assessment according to claim 1, wherein the individualized re-assessments comprise only the questions that are associated with parts of the skills model identified as improvement opportunities.

Description

Field of Invention: The present invention relates to the field of knowledge and skills assessment and, more particularly to web-based implementations within this field.

Background of invention: The learning and performance sectors have become increasingly focused on the Return on Investment (ROI) for training programs and initiatives. ROI can be significantly increased when training is targeted based on performance critical skill gaps, both at an individual level, at the corporate level and at various intermediate group levels. Skill Gap Analysis is the subject of many methodologies, techniques and software products: Currently terminology for which include Learning Management Systems (LMS) and Human Capital Management (HCM). The base concept for common Skill Gap Analysis is that learning or performance objectives be identified and that the current skill levels be measured against these objectives to determine what remedial action may be required.

The business opportunity at which the invention is targeted is the need to accurately measure performance and skill levels in individuals and in groups and, very importantly, follow-up any learning events that are identified as being required to determine the effectiveness of these learning events. Current methods of assessment include measuring skill levels through a variety of tactics including self-assessment, peer-assessment, supervisor-assessment, or a combination of these. Some, like this invention, measure skills by the development appropriate questions that are intended to measure what "they know" as opposed to what "they think they know." What distinguishes this invention is the inclusion of the targeted post intervention assessment that is developed, delivered and reported on for each participant in the assessment and improvement process. Other methodologies measure skills and knowledge levels although none follow up with targeted post assessments to determine the effectiveness of the learning events implemented as a consequence of the initial assessment.

This invention has, in large part, been a product of the evolution of a process that the inventors have contributed to over a number of years with a number of different clients. It's need and purpose have become evident as a direct result of anticipating and articulating the types of results and reports that clients need to help improve and measure the performance of their operatives.

Summary of Invention: The present invention provides a method and system for skills assessment and improvement that accurately measures the skill level of the subject in comparison to a defined skill model. Further, the method and system then re-assesses the subject's skill level after completion of the learning events that are "triggered" by the subject's responses in the initial assessment. This reassessment is individualized for each subject and reassessment is done only against parts of the skill model in which deficiencies were found. The invention is deployable on a microprocessor based computing device or networked communication client-server system.

The method and system can be described in four sequential steps:

1. The skills model and representative initial assessment is developed. The assessment comprises any number of multiple-choice questions formed in a two-

level hierarchical structure. The inventiveness of this step is in the method and system that, with a range of "granularity", assigns learning events based on a subjects response to individual questions, to a group of questions, to a higher level group of questions, and/ or to the entire assessment itself. For example, if a subject is assessed with an average of below, say, 70% for a group of questions, then he or she would be presented with an associated learning intervention.

2. The subject undertakes the initial assessment. This is typically done by connecting to a server computer via the Internet using a web browser with results being recorded in a database. Two outputs are generated in this step: a) A report showing a subject's results and, optionally, any prescribed learning events. b) An individualized reassessment document that comprises only the questions needed to reassess the subject on areas identified in the initial assessment as being deficient.

3. The subject participates in any prescribed learning events which can include, seminars, interviews, meetings, books, articles, online courses, classroom courses and the like.

4. The subject undertakes the post-assessment that resulted in step 2. A comparative report is generated to show differences between the initial and post assessments.

Brief Description of Drawings:

List of Drawings

Detail Description:

It is common in the art to deliver assessments and learning over the Internet from a central server computer to the end users who view and interact to these using a local computer with a web browser. This type of delivery uses common in the art web server technology and HTTP transmission together with server located databases to store both user responses and user details and credentials that allow secure and controlled access to the assessments and learning. The current preferred embodiment of the invention uses this general method through a proprietary software product known as GeMS and that provides many of the functions common in the art and often available in LMS (Learning Management System) applications. The invention is described below with occasion reference to this common in the art functionality since one skilled in the art would be able to build the invention using their choice of application to perform the LMS type functionality.

The invention allows groups of questions (assessments) to be created, uploaded to a server location, viewed and responded to by subjects with appropriate login information. Questions are multiple-choice and each selectable option has a numeric value associated with it. Assessments are structured in a two level hierarchical form and each question is associated with one or more positions on the hierarchy. Subjects' responses are the basis of reports that are generated and that show results in terms of the cumulative values for responses to all questions at each hierarchical level.

The Assessment, or levels within the assessment can be associated with Learning Events that are managed by a LMS. If a subject "triggers" the association, the subject can be automatically enrolled in the associated Learning Event(s). A follow-up, post assessment is generated at this point and this contains those questions from the initial assessment that are required to assess the hierarchical level with the assessment that were initially found to be deficient.

On completion of the learning events, the subject undertakes the post-assessment in a similar manner to that used to take the initial pre-assessment. A report is produced comparing pre-assessment and post-intervention assessment results. Fig.1 shows the high level process.

Assessments are developed as open standard XML documents. The inventors have modified a Windows Desktop Application referred to as SWIFT Author to assist in this development although other editing tools in the art could be similarly used for this purpose. The creation of Assessments can be summarized under the following headings:

1. Create Assessment
2. Create Questions
3. Associate Learning Events
4. Publish Assessment

1. Create Assessment: A menu option is provided that generates a "blank" Assessment template. The hierarchical structure of the Assessment is developed using menu options to add upper levels (Skill Categories). Lower levels (Skill Measures) can then be similarly added to each of the upper levels.
Each Assessment has a number of parameters that determine how the Assessment is presented.
Title – The name of the Assessment.
Comment (optional) – Presented to the user prior to commencement of the Assessment. Typically a short paragraph or two describing the Assessment.
Randomize – Questions are presented in a random order if this option is selected.
Presentation – There are four options for the presentation of questions within an Assessment
Multiple – all questions are presented on a scrolling page.
Frame – a question list is shown on the left side of the interface with a single question shown on the right side. Users can navigate through questions using both the question list and the forward and back buttons included in a navigation toolbar at the bottom of the interface.
Linear – similar to Frame except that no question list is included.
Linear No Back – similar to Linear except no Back button is available. Questions must be answered in succession.

SWIFT Author uses XML to represent and store Assessments. The document type is defined in Fig. 3. Fig 4 shows an example of an assessment represented as a XML document.

2. Create Questions: A menu option allows questions to be added to any of the lower levels of the Assessment hierarchy.
Questions are multiple choice comprising a body and two or more options. Both the body and the options are entered using SWIFT Author and can be in any HTML compliant format (text, images, multimedia etc)

Each question has a unique ID within each Assessment. This ID number is the key question identifier within the system.

Each question option has the following parameters:
Weight – can be any positive or negative integer. Represents the users response to a question.
Multiple Choice Question options also have:
Randomize – if selected, the options for the question are presented in a random fashion (shuffled) each time the question is asked.
Questions are represented and stored in XML. Fig 6 is a typical example of a question stored within a XML document.

3. Associate Learning Events: Assessments are comprised of questions that are structured in a two level hierarchy. Assessments are stored in the GeMS LMS alongside other types of learning and assessment content – known as Content Types. These include; eLearning courses, Instructor Led Training, Seminars, Documents, Assessments, and the like. Assessments and their hierarchical structured components can be associated with these content types and, consequently, users can be assigned learning events, based on their performance in the assessment and these associations between Assessments and content types.

The process of associating Learning events has four stages: linking, publishing, previewing and executing.

Links between learning events and the Assessment are defined in SWIFT Author and are stored in the Assessment xml file. The link can be established at the Assessment level, the Skill Category Level and/ or the Skill Measure level subject to the linking constraints noted below. Links have five parameters:
1. ContentID – Identifies the learning event within the LMS
2. Trigger1 – A value that corresponds to the sum of the responses (weighted values) for all the questions in that part of the assessment.
3. Trigger2 – Used with TriggerType "IsBetween"
4. TriggerType – Either "IsAbove", "IsBelow", "IsBetween", "IsEqualTo"
5. Comment
[NEED TO HAVE DANA LOOK AT ABOVE PARA. NEEDS TO MATCH DTD]

Links can be specified to all Content Types.

Any Content Type(s) can be linked from an assessment. Any user whose performance in the assessment is within the Triggers, will be assigned to the specified Content Type(s).

Any Content Type(s) can be linked from a Skill Category (part of the assessment). Any user whose performance in the Skill Category is within the Triggers, will be assigned to the specified Content Type(s).

Any Content Type(s) can be linked from a Skill Measure (part of the assessment). Any user whose performance in the Skill Measure is within the Triggers, will be assigned to the specified Content Type(s).

4. Publish Assessment: SWIFT Author publishes, or uploads, Assessments to the Server location from which Assessments will be presented to users. Assessments are stored on typically stored on a separate computer that runs GeMS.

A Publish Assessment menu option is available to upload an Assessment to any available network or Internet address. Upon execution of the menu option SWIFT Author will do the following:

- Validate the Server address - Ensures it is a proper address reachable from the PC on which SWIFT Author is running and from which the Assessment has been created. Note: Server address is given as either a domain name or as an IP address. Port 80 is implied with other ports requiring to be appended to the IP address or domain.
- Ensures that the Login ID used is valid.
- Ensures the password is valid.
- In the case of the publishing being a revision to an existing Assessment, ensure that no user is taking an Assessment in its current form.
- Localize any referenced files. E.g. images, audio, stylesheets whose location is specified within the xml document as being local (such as on a corporate network or on a workstations local hard drive) has the specified location "stripped out" and only the name of the referenced files remains.
- Copy the modified xml file to a specific folder at the Server location.
- Copy all referenced files to a specific folder at the Server location
- Create an appropriate record in the System database.

Once the assessment is created and published, subjects' (users') credentials are entered into the LMS and given permission to take the assessment. This is done by connecting to a server computer via the Internet using a web browser with results being recorded in a database.

Two outputs are generated in this step: a) A report showing a subject's results and any prescribed learning events. b) An individualized reassessment document that comprises only the questions needed to reassess the subject on areas identified in the initial assessment as being deficient.

A limitless variety of reports showing assessment results are possible. The following outlines the process for generating reports in the current preferred embodiment of the invention. An individual report is produced for each subject (See Fig. 7 and 8). Results are generated by reading from the system database (See Fig. 8) that stores the subject's responses to each question and from the assessment XML file that the weights associated with each response, the "trigger" values that determine if the cumulative responses to any part of the assessment require the intervention of learning events, and the learning events themselves. The responses for each question are evaluated and are then averaged at each of the two hierarchical levels

within the assessments. If any levels within the assessment that are evaluated "trigger" learning events then the learning event is included in the report.

An individualized post-intervention assessment is generated for each subject (See Fig 9) by querying the pre-assessment reports to identify levels within the assessment for which learning events have been specified. The initial pre-assessment XML is queried for each of these levels and corresponding questions are copied from the initial document and are compiled into a new document for each subject that is used to deliver the post-assessment.

After the subject engages with the prescribed learning events the subject undertakes the adapted post-assessment. A comparative report is generated to show differences between the initial and post assessments.

These reports are generated using a process similar to that used to generate the initial pre-assessment reports. The crucial difference is that for each question, two results are retrieved and computed: one for each of the assessments taken.