METHOD, SYSTEM AND COMPUTER PROGRAM FOR PROVIDING AN INTELLIGENT COLLABORATIVE CONTENT INFRASTRUCTURE

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ABSTRACT

The system of the present invention provides an E-learning platform that enables one or more student users to access teaching content that is in part user defined, from a variety of network-connected devices. In one aspect of the invention, the teaching content is user defined in that it is in part A) teacher generated or teacher assembled, and in part B) student generated or student directed, as further explained below. A system, method and computer program is provided for creating content and dynamically updating content is provided based on meta data extracted from semantic analysis of content and of electronic social interactions among users and between users and content.

Related U.S. Application Data

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Main Page

Social Header

Course List

System Social Feed

Recommended Courses

Fig. 1a
Course Page

Social Header

Episode List

Relevant Course Content

Course Social Feed
Course Name: 
Course Description: 

Add Course

Fig. 2b
Fig 2c
Fig 2f
Timesheet showing IN, OUT, and MARKER points. Can be added to and deleted from.
Fig. 2h
Drag and Drop Elements

Text
Image
Link
List

Slide

Keywords:

Word 1
Word 2
Word n

Remove
Remove
Remove

Recommended Keywords:

Word 1
Word 2
...
Word n

Add
Add
Add

Save

Fig. 2i
Fig. 2
Basic Course Information:
Course traffic graphs, etc.

Keyword Cloud:
Highlights "official" keywords

Assessment Information:
Well known concepts/keywords, unknown concepts/keywords

Social Information:
Discussion rates, active users, group activity

Fig. 2k
Basic Episode Information:
Course traffic graphs, platform specific traffic, etc.

Keyword Cloud:
Highlights "official" keywords

Learning Resources List:
Popularity of various Learning Resources
Additional Relevant Content

Assessment Information:
Well known concepts/keywords: unknown concepts/keywords

Social Information:
Discussion rates, active users, group activity

Text Heat Map:
Color coded system overlaid Episode Text to indicate popularity of text in notes

Slides/Text Heat Map:
Color coded system showing popularity of Slides and Video in notes and discussions.

Fig. 21
Fig. 3b
Fig. 3c
Fig. 5
Fig 6
Fig. 7

- Instant Message
- Discussions
- Notes
- Groups
- Courses

Input

Storage

Store Interaction

Extract Participants

Is interaction important?

No

Decrease relationship score

Update Participant Relationship Graph

Yes

Increase relationship score

Inform metadata engine of relationship
Fig. 8

Pre-processing (convert to standardized data model)

Generate keyword graph

Trim graph nodes

Search graph nodes

Deliver results

Storage

Weighting Map

Input

Keywords

Content

Translation Engine
Pre-processing (convert to standardized data model) 

Data collection 

Weighting Map 

Generate keyword graph 

Trim graph nodes 

Store graph 

Store keyword scores 

Translation Engine 

Fig. 9
Login Screen

Profile/Home

Manage
- Classes
- Learning Resources
- Groups
- Organizations
- Courses
- Students
- Assessments

Overviews of:
- Course Activity Overview
- Organization List (by relevance metrics)
- Course List (by relevance metrics)
- Inbox (messages, friends/classmates)

Settings
- Profile
- Account
- Access

Full Organization List

Full Course List

Message viewing, friend list/contact editing

Student Activity Monitor

• List/searching/narrowing
• Editing/creating/deleting

Fig. 11
METHOD, SYSTEM AND COMPUTER PROGRAM FOR PROVIDING AN INTELLIGENT COLLABORATIVE CONTENT INFRASTRUCTURE

FIELD OF THE INVENTION

The present invention relates to electronic education systems and methods and, more particularly, to a computer network-enabled education system and method.

BACKGROUND OF THE INVENTION

One aspect is making education more accessible to individuals requiring education but having jobs or other time commitments that interfere with traditional classroom learning during the day. Another aspect is improving access to enormous populations of would be students in countries where there is demand for quality education but so far education infrastructure is inadequate.

There is also a growing appreciation that economic development is closely tied to quality of education and therefore there is a desire of businesses and government institutions to significantly increase access to quality education often in very specific areas tied to economic opportunities.

Corporations especially require new solutions to provide effective teaching to their personnel despite distributed workforces, multiple business centers, different time zones, varying educational backgrounds of personnel, and increasingly diverse professional qualification requirements. Access to education is important for a range of reasons including certification (e.g. ISO), knowledge transfer, team collaboration, orientation, employee retention, engagement, addressing multi-generational workforces, improving skill development, and accountability.

Interactive learning technologies have played a role in improving accessibility by placing course materials on-line for consumption using Internet media and Internet communication. Learning management systems have appeared to enable such E-learning, including for example the E-learning platforms of Desire2Learn and Blackbox.

There is a need for new Internet based learning platforms and content generation and dissemination technologies that improve student engagement with educational content and involve students more in the learning process. There is a further need for content infrastructures including E-learning platforms that enable content to be updated dynamically and adapted to the special needs of each student no matter where they are located. There is also a need for content generation and dissemination platforms of digital content that enable dynamic generation or organization of content based on user direction.

SUMMARY OF THE INVENTION

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

A first aspect of the invention is provided comprising a computer implemented system for providing an intelligent collaborative content infrastructure, characterized in that the system comprises: (a) one or more computers including or being linked to a server computer, the server computer implementing a server application, the server application defining an intelligent collaborative content management utility, the intelligent collaborative content management utility being operable to: (b) manage a library of digital content items, and enable one or more users to access the digital content items; (c) capture and analyze (i) feedback from users regarding the digital content items, and (ii) interactions between users regarding the digital content items, and (d) based on the analysis of (b), dynamically create, assemble, modify, promote, or demote content, so as to generate collaborative digital content.

A second aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the server application is operable to enable the dynamic modification and/or customization of one or more of the digital content items based on the feedback and/or interactions.

Another aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the server computer includes or is linked to one or more social media utilities for monitoring social media interactions between users relevant to the digital content items.

A further aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the server computer further includes or is linked to an analysis utility, wherein the analysis utility is linked to the one or more social media utilities in order to enable the capture and analysis of social media interactions between users that relate to one or more particular digital content items.

A further aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the server application includes, or the server computer is linked to a semantic network engine, linked to the analysis utility, for enabling the semantic analysis of the feedback of users and/or the interactions between the users.

Another aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the analysis utility is operable to monitor feedback provided by one or more users regarding particular digital content items and/or the taking of notes by one or more users regarding particular digital content items using a note taking tool of the server application, or linked to the server computer.

A further aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the analysis utility is operable to define one or more attributes for a plurality of users, including demographic and/or location data, and the analysis utility is operable to interoperate with the content management utility so as to customize the digital content items based on such demographic and/or location data.

A further aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the one or more digital content items constitute educational content, and the analysis utility is operable to define one or more educational milestones or objec-
atives, and monitor one or more users’ progress in using the content management utility against such milestones or objectives.

[0016] A further aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the analysis utility is operable to identify one or more students that are not meeting the educational milestones or objectives, and suggest content and/or instructor interactions for such one or more students.

[0017] Another aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the analysis utility embodies one or more assessment tools, the assessment tools being operable to receive input from one or more students, and/or to receive performance data for one or more students relative to educational milestones or objectives, and based on such input or data generate a learning assessment for the one or more students.

[0018] Another aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the content management utility is operable to identify and retrieve digital content items, or modify digital content items dynamically, so as to produce digital content items in response to results of the learning assessment.

[0019] Another aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the storage utility is operable to monitor learning activities of users, and based on such learning activities identify shared learning attributes amongst two or more users, and based on such shared learning attributes the analysis utility being operable to suggest that the two or more users form a study group, using the social media utilities.

[0020] Another aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the server computer further implements a digital content item creation utility, the digital content item creation utility being operable to enable one or more users to assemble audio/video content, and to highlight one or more key concepts, the digital content item creation utility being operable to tag the audio/video content with the one or more key concepts.

[0021] A further aspect of the invention is provided comprising a computer implemented system of a previous aspect, characterized in that the server computer is operable to search for and locate digital content items from one or more databases connected to the server computer, or remote from the server computer, based on the feedback or interactions of the users.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022] The invention will be better understood and objects of the invention will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

[0023] FIGS. 1a, 1b, and 1c show representative web pages presented by the web presentation utility for enabling users to interact with the teaching content present by the intelligent collaborative content infrastructure of the present invention.

[0024] FIGS. 2a, 2b, 2c, 2d, 2e, 2f, 2g, 2h, 2i, 2j, 2k, and 2l illustrate the content generation and assembly workflow of the present invention in relation to representative web inter-

faces presented to a teacher for use of the content generation utility of the present invention.

[0025] FIG. 3a illustrates a representative workflow enabled by the platform of the present invention for creating video teaching content.

[0026] FIG. 3b illustrates a representative workflow enabled by the platform of the present invention for creating slide teaching content.

[0027] FIG. 3c illustrates a representative workflow enabled by the platform of the present invention that enables the combination of content in different media to create multimedia content.

[0028] FIG. 4 illustrates a representative system implementation of the present invention.

[0029] FIG. 5 is a workflow diagram illustrating a representative workflow for creating text content by operation of the content engine.

[0030] FIG. 6 is a workflow diagram illustrating a representative workflow for extracting interaction data by operation of the social media utility.

[0031] FIG. 7 is a workflow diagram illustrating a representative workflow for extracting meta data from interactions between users in connection with the social media utility.

[0032] FIG. 8 is a workflow diagram illustrating a representative workflow for searching for relevant data based on meta data.

[0033] FIG. 9 is a workflow diagram illustrating a representative workflow for adding new meta data to the system of the present invention.

[0034] FIG. 10 illustrates the resources of the platform of the invention available to a creator, for example a teacher.

[0035] FIG. 11 illustrates a possible implementation of the present invention and shows the administrative resources that may be associated with an administrative user of the platform of the present invention.

[0036] In the drawings, embodiments of the invention are illustrated by way of example. It is to be expressly understood that the description and drawings are only for the purpose of illustration and as an aid to understanding, and are not intended as a definition of the limits of the invention.

DETAILED DESCRIPTION

[0037] The system of the present invention provides an intelligent collaborative content infrastructure that enables one or more student users to access teaching content that is in part user defined, from a variety of network-connected devices. In one aspect of the invention, the teaching content is user defined in that it is in part A) content creator generated, the content creator generally being a teacher and/or for example an administrator, and in part B) additional content generated by the consumers of the content A), for example a student as further explained below.

[0038] The technology described herein may be applied beyond E-learning to other examples of user defined creation and dissemination of digital content, with social media functionality for interaction among users and with the digital content. In fact, the invention is best understood as providing an intelligent collaborative content infrastructure that enables content to be disseminated in an intelligent fashion, including in connection with collaborative activities, and also such that content is collaboratively created or enhanced. It is also noted that the disclosure sometimes refers to “students” but also sometimes more generally to “users”.

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The invention is explained in connection with one implementation thereof, namely as an E-learning platform, which is one example of an intelligent collaborative content infrastructure in accordance with the present invention. The references to an “E-learning platform” should also understand to extent to other applications of such an intelligent collaborative content infrastructure.

This patent application references “teaching content” as defined below. But it should be understood that the present invention applies to any content where dynamic updating based on user interaction (with the content or among users) is desirable. The present invention describes a content infrastructure with particular attributes or functions. It should be understood that the present invention may be implemented in a number of different ways, using different collaborative technologies, data frameworks, semantic tools, data modeling tools, communication technologies, and web technologies. The present technology could also be integrated into one or more of such third party technologies, or such third party technologies could be modified to include the functionality described in this invention.

It should be understood that the content created or assembled by operation of the present invention is generally multimedia content. Content described, for example teaching content may include any manner of digital content, whether audio, video, graphical content or text, in any structure, format or medium. The teaching content may include or incorporate for example e-books, articles, selections of e-books or articles, compilations of works, dynamically generated document summaries, data feeds such as RSS or TWITTER®, feeds, blogs or blog portions, web excerpts, search results, and so on. The teaching content may also include music files, e-artifacts, and so on. Any such digital content item may be referred to in this disclosure as an “information object”.

One aspect of the E-learning platform in accordance with the present invention includes or is linked to a web presentment utility that is operable to present a series of web pages associated with specific educational objectives (such as for example web pages related to a particular educational module such as a course). These web pages provide access to and organize interrelated information objects that comprise the teaching content in a way that advances learning goals for the subject matter and for the students for a particular course based on their progress, as further explained below.

A teaching content creation utility enables a content creator such as a teacher, professor, librarian, content manager, trainer, instructor, team leader, mentor, or subject matter expert (collectively referred to as “teacher”) to create teaching content and also assemble or link to supporting content. It should be understood that “student” refers to any individual viewing, downloading, streaming or otherwise consuming the teaching content. A student may be self-enrolled or enrolled in an E-learning program whether offered by a university, college, or other educational institution, an organization offering education to its personnel, or a government organization offering educational programs to its citizens or a group of citizens.

The E-learning platform is operable to obtain meta data associated with the teaching content, or with interaction between one or more students based on the content, directly or indirectly, as further explained below.

The meta data, also as further explained below, may be gathered by the platform for example from: (1) tagging of audio/video teaching content created or assembled by a teacher to highlight key concepts for example of a particular educational content module, (2) extracted from documents, presentations or other information objects that from the teaching content, (3) data collected based on students consuming specific teaching content, discussing specific teaching content for example using the social media utilities referred to below, or indicating interest in specific teaching content for example by creating “votes” in regard to specific content, or digitally linking particular labels to specific information objects such as for example “LIKE IT”, “VERY RELevANT”, “OK”, “OFFENSIVE” etc.

The meta data provides the underpinning for an analytics utility that is operable to analyze either continuously or based on predetermined learning related milestones, how the educational content, as it is defined for specific students, groups of students or all students, at a particular point in time is being received by the relevant students. Do the students like the content, do they find specific content uninteresting, do they express dislike in connection with content but despite this does specific content initiate significant discussions between students? The output of application of such analytics yields data that enables the ranking of specific educational content based on criteria defining relative educational value, dependent on the learning objectives that have been defined for the educational module.

In one aspect of the invention, the E-learning platform is operable to dynamically assess the educational content and based on such assessment the E-learning platform may dynamically enable modification of content by the teacher(s) and/or students, the promotion of specific educational content to a position of greater prominence in the web pages, or the demotion of specific educational content to a position of lesser prominence in the web pages, as further explained below. Modification, for example, may involve deletion of content, annotating of content, highlighting of specific portions of content etc. This aspect of the E-learning platform may function as a WIKI, provided in a manner that is known.

Alternatively, the assessment of the educational content may provisionally earmark particular educational content for modification/promotion/demotion based on the requirement of a further decision from the teacher and/or the students (specific students, groups of students or all students). For example, a particular information object may require a certain number of “votes” for students for promotion or demotion. The present invention contemplates incorporation of democratic concepts—spread across all students or groups of students—in order to further involve students in the teaching process, in this case by including them in mediation of the dynamic modification/promotion/demotion of particular teaching content.

It should be understood that the system may define one or more permissions/restrictions around the modification/promotion/demotion of teaching content. For example there may be permissions/restrictions based on certain teaching content constituting “core” content and therefore not being subject to modification/promotion/demotion or some subset thereof or stage of the course. Additionally the permissions/restrictions may be based on “student attributes” including progress of students, or culture, language, educational background, ethnicity, religion or other demographic data for students. Also, other parameters may be defined by teachers and/or system defined parameters for creating or assembling teaching content. In other words, the system allows enabling and disabling of specific features within one
or more domains such as a particular systems, organization, course, class, or specific interactive elements. Additionally, restrictions may be based upon student attributes in addition to the above includes geographic location (content and features enabled or disabled depending upon location).

In another aspect of the present invention, the E-learning platform based on predetermined permissions/restrictions may enable the updating of the teaching content to include new content from one or more electronic libraries associated with the platform, or that is otherwise located by teacher(s) and/or students presented for inclusion. This updating may occur dynamically based for example on the meta data or based on for example suggestion by one or more students or suggestions combined with approval by the teacher(s).

It should be understood that content items may also be pulled dynamically from other part of the platform of the present invention. New content can be pulled for example from other places in the platform or from a remote linked platform, and the content may include for example discussions, episodes, content from partners, notes, websites, blog content, RSS feeds, or any other manner of content. The inclusion can be dynamic based upon Digital DNA (also referred to herein as “DDNA”) for example (using meta data) or can be explicitly included by the content creator during the content modification process. Recommendations may be provided during the content creation/modification process, and may for example be initiated by a content recommendation engine that is part of the system of the present invention.

The E-learning platform may include or be linked to one or more intelligent filters that enable presented information objects to be assessed for relevance to other components of the teaching content and other criteria such as content analysis for other qualitative criteria such as acceptance by recognized subject matter experts of an author's work or student attributes. This could be implemented using for example a web utility that analyzes content based citation of its author by a list of authors who are recognized for their work in an area defined by the meaning of a particular information object.

The recommendation engine may be configured to process the DDNA and store recommendations based upon intelligent filters. The intelligent filters may be operable to compare particular components (these depend upon the content being compared) of the DDNA including language, keywords, and context (as an example) of both the content being viewed and the student attributes. This may be a two step process overall, the first step is that the recommendation engine (18) determines the relevance of the content (this may be a numerical floating point number that is to be viewed for other content (internal and external). The second step is to compare user attributes to the filtered content using the same relevance system. The resulting “n” items may be displayed by the E-learning platform.

The intelligent filters thereby enable teaching content to be updated dynamically but based on filtering to determine whether specific content is “appropriate” relative to a number of different possible criteria.

The intelligent filters may also be operable to incorporate other techniques for assessing content, such as for example searching the Internet for social interaction in regard to specific content so as to, for example, rank more highly for inclusion in the teaching content, content that in relative terms is under significant “discussion” on the Internet.

The intelligent filters may operate on other techniques such as searching both the Internet and internally for social interactions. Interactions may include discussions between users, occurrences of material via links contained within other media, and direct rating/storage (add to favourites) of content. As an example: the intelligent filters may scan for how much a piece of content has been marked as a “favourite” by users of the platform and may use this to determine popularity/importance. Popularity/importance may be factored in directly during relevance with a relative weight. The recommendation engine may utilize various domains depending upon the context.

The intelligent filters of the present invention may enable additional content to be self-populated into the web pages.

The present invention may utilize intelligent filters that incorporate or are based on machine learning technologies such that they continually improve over time as they learn to interpret user areas of interest and suggestions on content using results from previous searches.

Specifically, the E-learning platform may include or link to a semantic network engine to dynamically generate for
example synsets for the initial meta data set, and the links between synsets or groupings of synsets, to provide better analysis of the interaction between students and the teaching content.

[0064] As previously explained the interactions are analyzed by the social engine, which is best understood as an engine that is operable to capture and analyze various social interactions between users, including in relation to particular teaching content.

[0065] The extraction referred to above may be enabled using language analysis or document summarization technologies or techniques.

[0066] Depending on space separated languages (most languages such as Latin languages) or others (Chinese for instance) processing systems are able to differentiate between languages. Using a probabilistic system the occurrences of languages allow determinations of languages and further processing. Further processing may include natural language systems which can determine meaning for each language. Determining common meanings and storing them in a singular mapping allows DDNA systems to compare similar meanings. Keywords may also be enhanced with NL processing by storing additional context modified keywords rather than individual keywords.

[0067] In another aspect of the present invention, the E-learning platform enables the teaching content to be customized for specific students, or groups of students based on their student attributes but also based on their location. The E-learning platform of the present invention therefore enables the students to create a version of course materials with supporting multimedia content that reflects the areas of interest of specific students, groups of students, or all students. Also, the present invention can, by analysis of the meta data, track the progress of specific students and provide reports to this effect to the teacher. These reports may identify performance relative to learning goals linked to a particular stage of an educational module, or sub-module. Leveraging aspects of the E-learning platform, the present technology is operable to provide, with sufficient meta data, indications of possible concepts that a student is perhaps not understanding as well as they should. This may result in the system dynamically suggesting additional reference information regarding this concept, or based on an alert to the teacher the teacher may engage with the student perhaps in person or through electronic communications to explain these concepts. This avoids certain students falling behind because they do not acquire specific building blocks required for learning in a specific area.

[0068] For example, by system of the present invention monitoring large groups of DDNA the combined weightings can result in “hot spots” (high value weightings) and “cold spots”. By comparing DDNA of a current user to the ideal hot spot map, weaknesses can be determined.

[0069] Those weakness maps may then be used to find material that are “hot” where the a user’s DDNA is cold (but should be hot). The mappings can also be converted to user friendly display systems to suggest content but also identify to the user areas where they are weak. The same systems can be used by a teacher to analyze a class.

[0070] This last described aspect of the technology highlights a particular implication of the present invention: rather than isolating teachers from students, the technology may direct immediate contact between teachers to students to areas where the assistance of the teacher is more relevant to the student, his/her attributes, and his/her progress in relation to the learning objectives. From this perspective, the described technology affords opportunities to improve learning even in traditional bricks and mortar teaching situations. Courses for example may be enriched using the technology, and in effect replacing in whole or in part lecture style classes and enabling teachers to focus on specific student directed teaching efforts, small class seminars or meetings based on progress of specific students or groups of students relative to learning objectives.

[0071] Through continuous use of the DDNA analysis for hot and cold spots teachers can create additional learning content for a class to demonstrate a particular concept.

[0072] The present invention enables progress to be tracked, and the teaching content to either dynamically adjust based on progress (by adapting new content covering gaps in learning, or accelerating learning if learning objectives have been met), or to be adjusted based on the teacher initiating aspects of the administration modules of the E-learning platform. These adjustments to teaching content based on progress captured by the E-learning platform dynamically may provide a better indication of progress than traditional testing. Also, because of time constraints, many courses do not offer testing on a regular basis. The E-learning platform of the present invention is operable to effect track student progress continuously or near continuously, once a sufficient amount of data has been collected.

[0073] As a further aspect of tracking and customizing the learning experience, the E-learning platform is operable to identify when one or more students fall into one or more predetermined behaviour profiles that may require teacher assistance or intervention. One example is if a student is disengaged for example because he or she has not interacted with content, made notes etc. Learning results can be improved by identifying and addressing such behaviour early on.

[0074] Despite the use of digital technology and some loss of physical immediacy between teachers and students, the present E-learning platform, as designed and configured, may provide a more caring and nurturing learning environment.

[0075] In a related aspect, the E-learning platform includes or is linked to a translation engine that is operable to translate in whole or in part selected or all information objects that may be translated using the translation engine. In another particular aspect of the present invention, the translation of information objects making up the teaching content may also be user defined by for example enabling students to modify the machine generated translation of specific teaching content, for example, based on a WIKI tool for collaboratively improving translations. The E-learning platform is operable to analyze student proffered translations, for example, and compiling translation data into a database which may be used to improve performance of the translation engine. As the E-learning platform of the present invention scales to include significant numbers of students speaking a number of different languages, the translation engine of the present invention becomes a valuable resource that can be leveraged for other applications and revenue sources.

[0076] The E-learning platform of the present invention is operable to enable students to access teaching content and to engage in social interactions facilitated by the social media utilities part of or linked to the platform from a variety of network-connected devices. In a particular aspect of the present invention, the platform is operable to detect the device
parameters of a student’s network-connected device and based on this adjust the presentment of the teaching content and/or social interaction supported by the platform. For example, if a particular student, at a particular time is accessing the web pages from a mobile device then a mobile site version of the web pages may be presented dynamically, and the teaching content may be provided based on content parameters that optimize access to and interaction with the teaching content from the particular mobile device. Further details regarding this aspect are provided below. In addition, the present invention may also provide a mobile application that is operable to enable students to connect to the E-learning platform of the invention.

[0077] It should be understood that while the present invention is mainly described in the context of an E-learning platform of the present invention, the present invention also provides a platform for dynamic and collaborative content generation and direction including based on user generated multimedia content and dynamic modification/demotion/promotion of multimedia contents based on user defined criteria, including by dynamic population of external information objects into the content using intelligent filters.

[0078] The content generation method of the present invention is best understood by first explaining one example of teaching content presented by operation of the web presentment utility further explained above. The web presentment utility is operable to organize teaching content in a way that is easy for users to navigate.

Content Presentation

[0079] FIGS. 1a, 1b, and 1c show representative web pages presented by the web presentment utility for enabling users to interact with the teaching content present by the platform of the present invention.

[0080] FIG. 1a shows a representative main page for the web pages made available via the web presentment utility of the present invention. In this representative embodiment, the main page consists of four areas displayed. The “social header” may be common to all web pages and may include important notifications, as determined for example by operation of the analysis utility as explained below. The “social header” is best understood as a tool bar that may include quick links global messaging, discussions, groups, and other tools. The toolbar may also include or link to a search utility that may be operable to conduct searches using the meta data engine to find relevant content. The course list may display user courses as well as optionally user relevant data such as certain new discussions, new relevant content created or assembled by operation of the content engine.

[0081] The toolbar may include a search area, and the linked search component may be configured to initiate context sensitive search requests. Depending upon what content is being viewed or area of the system that context is passed to the search engine and used in the weighting system with regards to the ordering of results.

[0082] The main page may also include a “system social feed” which may be a filtered social feed, for example by operation of the filters for example. The social feed may include the most significant interactions directly and indirectly related to the User. In one aspect of the invention, the user may choose to toggle and display all directly relevant social interactions. Upon toggling the indirect social interactions may not be removed but new ones are not added. The recommended courses area may rely on the semantic network engine, which is further described below, so as to suggest other courses that may be of interest to the student or that student is advised to take based on the subject matter of the current course list and optionally based on performance of the student in specific areas defined by the assessment utility. The recommended courses area may rely on the analysis utility to find a course and/or specific episodes that are relevant to a user. A number of filters implemented to the analysis utility may enable related content to be associated to the recommended courses, and this content may also be presented in the web pages. Social interactions, assessment history, and various output of the analysis utility may be used to generate the recommended course list. The courses may be weighted based upon frequency of occurrence, weaknesses and strengths identified through assessments, user interest in specific topics (may be derived from the analysis utility, and also system specified interest based upon outside factors that are assigned by the analysis utility. The courses are then displayed from highest score to lowest score and the list is truncated based upon available display space. The recommended courses may also be defined based on friends of a student taking that course. This provides a useful tool for promoting courses to students who may be interested in doing extra work if their friends are taking a particular course.

[0083] The social feed system looks at what courses the user is primarily interacting with (these are the active courses) and then analyzes them for relevant activity. Relevant activity can be determined through DNA analysis of what the user is most interested in. While the user is using the system each event enhances the user’s DNA of “current interests”. Discussions, browsing of courses/episodes, and notes enhance the current interests DNA (this degrades over time through the feedback system previously discussed). The current interests DNA is then used against discussions occurring in courses as well as other materials.

[0084] FIG. 1b shows another representative web page generated by the web presentment utility, in this case showing a “course page”. The main page may link to one or more course pages. The course page may provide an episode list to show a user the “episodes” of a the particular course as well as the course itself, and is further operable to display pertinent information much like for courses on the main page. As explained above, teaching content that is course content in accordance with the present invention is generally broken down into shorter, manageable “episodes”. The relevant course content displays content from within the course that has been determined to be relevant to the user by operation of the system. The content may be retrieved from the database by operation of the content engine and the analysis utility based on the meta data. The social feed may be a filtered social feed much as in the case of the main page but may contain course level relevant interactions rather than ones relevant for the system as a whole.

[0085] FIG. 1c shows a representative arrangement for a web page that is an episode page. The social header may include interactions related to the episode as opposed to the course as a whole or the full system. The “learning resources” area may include content created or assembled by the teacher, but also promoted to this area based on operation of the content engine and analysis utility. The learning resources area may contain dynamic as well as static components. In one particular aspect of the present invention, the dynamic components of the learning resources area are linked to the video and slide areas such that as the content of one or more
of the video and slide areas changes, so does the learning resources area so as to enable access to related information. The semantic network engine supports the analysis utility in identifying related content. The video area is provided such that it displays a video suited to the student’s connection and also their network connected device. The slide area displays slides, which may be synched to the video. The slides contain: text, images, embedded video, and links to relevant content. The text area displays text relevant to the content being shown by the video area or slides area, based on operations of the content engine explained below.

[0086] The description above explains generally how teaching content is presented by the system.

System Implementation

[0087] The system of the present invention is best understood by reference to FIG. 4.

[0088] The present invention, in one aspect thereof, may be implemented as a computer program. Server application software (14) and databases (12) may execute on both centralized computers (10) and distributed, decentralized systems. The Internet or any other private or public network (for example a company’s intranet) may be used as the network to communicate between the centralized servers and the various computing devices and distributed systems that interact with it.

[0089] In one aspect of the computer program, the user interface may be provided to a user via a web server that is operable to deliver web pages (36). In particular the computer program includes a web presentment utility (34) that is operable to generate a series of web pages that incorporate the information objects (32). The content engine defines the associated information objects (32), including dynamically as explained further below. The web presentment utility (34) is best understood as a WMS that deploys the information objects into specific web arrangements and links to the web pages specific web functions. The web pages presented enable users link to specific functions of the system made accessible to them, for example the social media utility (26).

[0090] The system may include an administration module (12) that is used to manage access of specific users to specific functions of the system. The administration module (12) manages for example assignment of administrative access to teachers or other content managers for accessing the system, defining the course parameters, permissions associated with a teacher as opposed to a student for example in relation to the teaching content, and so on. The administration module also plays a role in defining permissions or restrictions relative to dynamic modification/promotion/demotion of teaching content based on specific stages of a course. For example, a teacher of a course may initially want the students to focus on acquiring particular knowledge through “core” information objects and therefore the dynamic generation or incorporation of new related information objects based on the subject matter or interaction with the subject matter through the social media utility (26), as analyzed by operation of the analysis utility (22) may be shut off or limited. Various other functions may be enabled by the administration module (12).

[0091] The social media utility (26) is best understood as a computer program or series of computer programs that provide the means for any manner of electronic communications between users of the system including but not limited to discussion threads, message boards, instant messaging, posts, blogs and so on. The social media utility contemplates the use of any existing and any to be deployed form of social media. The social media utility also enables the linking of the system to third party social media utilities such as FACEBOOK™ and others. This way the social media utility (26) acts as an interface between the system and third party systems so as to enable the extraction of meta data from the social interactions occurring in relation to the third party system to the extent that these are between users of the present system.

[0092] The assessment utility (28) is best understood as a computer program or series of computer programs that define one or more evaluation methodologies for tracking student performance on an ongoing performance, or based on certain learning milestones having been met. Teachers may have administrative access to the assessment utility (28) to define various parameters for assessing students based on teaching goals and teaching philosophies for example. It is contemplated that the assessment utility (28) will embody various online assessment technologies as these continue to evolve.

[0093] The assessment utility (28) also enables students to “rate” courses, content and teachers.

[0094] The content engine (18) is best understood as a computer program or series of computer programs that enable the creation or assembly of the teaching content, based on teacher input but also on student input, as further explained below. The meta data engine (20) is operable to define a list of specific activities or interactions that occur relative to the system operations that are deemed to be relevant from a content creation or assembly perspective, an assessment perspective, translation perspective and so on. This includes for example specific interactions or communications occurring by operation of the social media utility (26). The meta data engine tracks these activities or interactions and stores associated data to the database 12. The analysis utility (22) enables the automated analysis of these activities or interactions, based on one or more configurations defined for a particular course, or particular episode even, for example based on selection or definition of the teacher using the administration module (16). The analysis utility (22) may rely on functions of the semantic network engine (24) for example to dynamically generate knowledge representations relevant to specific teaching content, to aid in analyzing for example the teaching content to define other content whether stored to the database (12) or by searching the Internet that is relevant to the teaching content. In one aspect of implementation of the semantic engine, semantic linking is used and data modeling (such as weighting techniques) to provide the right level of semantic analysis given the objectives of the system and also the requirement for real time and near real time linking of dynamically changing content.

[0095] The translation engine (38) may be a computer program or series of computer programs that enable translation of teaching content from one language to one or more other languages. The translation engine (38) may link to third party computers that provide for example web based translation services in order to access translation services. In another aspect of the invention, the translation engine is operable to build its own translation database over time. The translation of information objects making up the teaching content may also be user defined by for example enabling students to modify the machine generated translation of specific teaching content, using the content engine, which in part functions as a WIKI tool where student input is possible. This enables collaborative extension and improvement of the translation database created within database (12) or in a separate data-
base (not shown). The analysis utility (22) may analyze student translations and possibly based on input from a translation editor accepts new translation data into the translation database. In one aspect of the invention, the translation database of the present invention may be leverage by the operator of the system to provide access to translation services or to license specific data sets to others.

The translation engine is operable to obtain audio captured from a video or text capture from a presentation for example, or key words or other content, and translate this content dynamically.

The present invention may also include an ad engine (40) which obtains ad information, likely in co-operation with an online ad service. The ad engine (40) may be understood as an interface to a remote online ad service. The ad engine (40) cooperates with the content engine (18) to associated selected ads with particular information objects (32), whether based on the subject matter of the information objects, demographics of relevant users, or ad permissions defined by the teacher or the organization of which the teacher is a part. It should be understood that in relation to certain courses or episodes the ad engine may be “shut off” but for other courses or episodes, where operation of the ad engine (40) is permitted, the placement of selected ads into the web pages made available using the system may provide a significant revenue source, which may be allocated in a number of ways.

The use of the web server, or client-side software program, and the processing server may provide a means for distributed computing benefits, for example hosted application service provider (ASP) processing models or software-as-a-service (SaaS) application delivery models. Under these models, a third party may offer an E learning platform for several entities to use to load their teaching content, create courses, and promote and deliver their teaching content to students.

The present invention may also be operable over a wireless infrastructure. Present wireless devices are often provided with web browsing capabilities, whether through WAP or traditional means. The user interface of the present invention may be provided to the wireless devices, with processing occurring on the server side of the communication channel or any server associated with such a network.

Content Generation

All content in the system (including everything in the previous section, courses, ads, feeds, etc.) may be accessed using an abstract messaging system that is part of the system of the present invention. In one implementation of the present invention, based on a dynamic messaging architecture used the messages can be fed to either local handlers or remote handlers via a RPC (architecture can change based upon load and caching). As such the web presentation does not need to implement all of the access and analysis methods (it does very little of this) but rather deals with presenting contents after retrieval.

The E-learning platform includes or is linked to a content generation utility or content engine (18), as explained further below. The content engine (18) in one aspect thereof provides a tool or series of tools that enable a teacher or teachers to create or assemble teaching content. Likely, as explained below, the teaching content may start with a teacher defined set of information objects, but this may expand and evolve with modification/promotion/demotion by students as a result of their continuing interaction with the information objects or their submission of related teaching content. In one aspect of the invention, the content engine (18) enables the teacher(s) to create or assemble “core” information objects that comprise the teaching content, or to define information objects that constitute a base line for teaching content, which may then be modified by students subsequently by operation of the E-learning platform.

In one aspect of the content generation utility, it is operable to guide the creation or assembly of teaching content that, based on best practices, provides effective learning opportunities for students (or specific demographic groups of students) via electronic media. Informed by these best practices, the content generation utility may establish parameters for specific media to be used, interaction with education content (individual and group), and presentation of teaching content including one type or medium of teaching content relative to other types or media of teaching content.

FIGS. 2a to 2f are representative illustrations of possible content creation or assembly activities that may be undertaken using the content engine.

The basic content management workflow enabled by the content engine may include: Add a Course, Edit Course, Add an Episode, Upload Episode Video, Edit Episode Video, Create Course Slides, Add Episode Text, Add Learning Resources, and then push “Live”. At any time the content manager (usually the teacher for E-learning applications) can also add additional keywords, Video, Slides, Learning Resources, and view Analytics. Based on Analytics the content manager can add or remove Content.

The description immediately below highlights some of the functions of the system relative to content engine operations. The Figs. abstract representative interfaces that may be used to access the user generated content management functions of the content engine (these are usually teacher functions). In general, the system provides an event based system that enables interrelates associated content such that even if for example a user manipulates the video content by skipping position, pausing, playback etc., the content associated to the particular content of the video at the specific point of the recording will be dynamically retrieved and displayed. In other words, the system is operable to synchronize multiple related information objects.
Learning Manager—Add Episode, FIG. 2d

[0113] Provides basic episode information so that a placeholder can be created for entry into the Editor.

Learning Manager—Edit Episode, FIG. 2e.

[0114] Update basic episode information.

[0115] Update episode state.

[0116] Add/Remove episode keywords.

Learning Manager—Manage Episode Videos, FIG. 2f.

[0117] Upload new video section.

[0118] Reorder video sections.

[0119] These sections are a single Episode that might be produced in different sections.

[0120] Learning Manager—Episode—Edit Video, FIG. 2g. This FIG illustrates the operation of a number of important functions related to creation of the video and also synchronization of the video with other information objects.

[0121] Set the start and end points of each Video.

[0122] Specify whether there are any parts of a Video to remove.

[0123] Set “IN” points that specify valid content start.

[0124] Set “OUT” points that specify valid content ends.

[0125] Set “MARKER” which is used to signify a Slide transition point.

[0126] Skip forwards and backwards a few seconds to allow easier editing of IN and OUT points.

[0127] Timeline shows IN, OUT, and MARKER points.

[0128] Timeline has a time bar that can be dragged.

Learning Manager—Episode—Add/Edit Slides Main, FIG. 2h.

[0129] Add Slides in sync with Video.

[0130] Design a Slide as well as contents.

Learning Manager—Episode—Edit Slide, FIG. 2i.

[0131] Drag and Drop Editor that allows placement of elements.

[0132] Keyword Editor to display and add Meta Data to the slide to be used for dynamic relevant content.

Learning Manager—Episode—Add/Edit Learning Resources, FIG. 2j.

[0133] Edit/Remove current resources.

[0134] Add recommended resources.

[0135] Add a new resource.

Learning Manager—View Course Analytics, FIG. 2k.

[0136] Information that can help a content manager such as a teacher to improve a course. The information is obtained by operation of the assessment utility and the analytics utility.

Learning Manager—View Episode Analytics, FIG. 2l.

[0137] Information that can help a Manager to improve an episode.

[0138] FIGS. 3a, 3b, and 3c further illustrate possible features and functions of the content engine.

[0139] FIG. 3a illustrates a representative workflow enabled by the platform of the present invention for creating video teaching content.

[0140] FIG. 3b illustrates a representative workflow enabled by the platform of the present invention for creating slide teaching content.

[0141] FIG. 3c illustrates a representative workflow enabled by the platform of the present invention that enables the combination of content in different media to create multimedia content.

[0142] Regarding FIG. 3a, this diagram illustrates a possible workflow enabled by the content engine in connection with information objects that consist of video. Video may be received or obtained as input and stored for use at a later date. Audio may be extracted from the video and then converted to text. The resulting text may be used as base content, which is entered to the system and the social media utility may detect interaction with the input as context (for example an Episode, Course, Discussion, Notes, etc.). The content engine permits video to be related to slides in order to assign video meta data to slides, and video by operation of the system may provide context to associated portions of slide content. The content of slides, or selected portions thereof, may be translated into various languages and then stored by operation of the translation engine. Content may also be sent to the meta data engine to have a keyword graph assigned to it as further explained elsewhere. Additionally, the content engine is operable to render the video content to various bit rates for delivery at various connection speeds.

[0143] FIG. 3b illustrates a possible workflow of the content engine in connection with information objects that consist of presentation slides. Slides may be received or obtained as input and stored for use at a later date. Base content may be entered and the social media utility may detect interaction with the input as context (for example an Episode, Course, Discussion, Notes, etc.). The content engine permits slides to be related to video in order to assign slide meta data to video, and slides by operation of the system may provide context to associated portions of video content. The content of slides, or selected portions thereof, may be translated into various languages and then stored by operation of the translation engine. Content may also be sent to the meta data engine to have a keyword graph assigned to it as further explained elsewhere.

[0144] Similarly, for web content, the web content may be treated by the system essentially as text. Web content may be generalized or summarized by the system. The analysis utility may identify links to other sites, search engine results, and uploaded documents. The analysis utility may interoperate with the semantic network engine for this purpose. YouTube, Vimeo, and other videos may be linked or uploaded to the system and meta data may be dynamically assigned through keywords on the remote content page as well as keywords assigned to the data on upload.

[0145] FIG. 3c illustrates a representative workflow of content engine functions associated with the combination of content from different media to form specific multimedia combinations in accordance with the present invention. Different content combinations may be required for different platforms, and especially in connection with mobile devices for example a combination of content may provide multimedia content that is optimal to consume using these devices. Video data may be re-encoded at various bit rates depending on device requirements. The Web presentation utility may be operable to fit and size content to the particular mobile device’s screen to ensure content views well. Audio content may be extracted and translated to text for later stages as well as adding additional meta data to the video content.

Extracted
text may be translated and combined with video to provide subtitles for those viewers that may not fully understand the original spoken language. Additionally, extracted text may simply be placed over the video to add additional subtitle capabilities. Audio may also be extracted and placed over rendered video of slides for example so that the user may choose to view slides on a mobile device. Video and slides may be combined with the original audio content to form a new video that alternates between the original video and rendered slide content (the slides may be in translated form at this point).

[0146] The workflows for the content engine illustrate that in one aspect thereof, the functions of the content engine may operate in a linear manner. (1) A base request is processed by one or many of the utilities or engines of the system, (2) the content is then enhanced by adding additional content to support the output content, (3) an interface for example a web page rendered by the server presentment utility) is then generated around all pieces of content, and (4) finally the interface is delivered to the user’s network-connected device based on information regarding the device, software, and network connection parameters of the device.

[0147] This is often followed by (5) an “enhancement” phase which may involve generating additional content. An example of additional content would be to load mobile versions of videos based upon a mobile content “Token” being generated. Additional content may also include items such as a Social Feed or even a modified Page Title. Another example of enhancement is that if the assessment utility identifies areas of weakness of a particular user, then for example the system is operable to (a) identify additional content that may be useful to the user, including based on information being currently consumed by the user, (b) this content may be linked to associated content already presented to the user, (c) specific content or selections of content may be highlighted for the user, based on relevance relative to either the content that the user is currently consuming or for example information regarding areas of weakness for the user, as determined by operation of the assessment utility. Highlighting may include bolding certain text, changing text color, or color of other data objects, increasing the volume around specific ideas likely to be important for this particular user. The enhancements may even result in dynamic enhancements to specific content, for example, addition of additional video content to a video; addition of selected additional video content to a video; addition of specific slides within a slide presentation to explain in greater detail concepts that perhaps the user does not fully understand yet, etc.

[0148] The present invention also contemplates adjusting the presentation of content to compensate for specific attributes of students such as visual impairment, color blindness, hearing impairment and so on.

[0149] The description that follows describes some additional features and functions of the utilities shown in FIG. 4.

[0150] The content engine (18) is further operable to: (1) accept original video content and re-encode it appropriately for a variety of delivery platforms; and (2) combine various types of content to present it in new formats. The content engine cooperates with the translation engine to convert content between languages as well as combining content from various languages to better engage a user. The content engine also allows user feedback on content for self-improvement as well as improvement by content creators.

[0151] The meta data engine gathers data from users, courses, episodes, discussions, notes, chats, video, slides, and text. It assigns weighting to data components based upon frequency of specific keywords and proximity to other keywords. Meta data may also be selectively assigned for example to content, users, and groups. The meta data engine may also accept data from other utilities or engines. The meta data engine may incorporate or link to a relational engine to determine what a user does and doesn’t deem to be important. Alternatively, the relational functionality may be included in the analysis utility. These functions may be enhanced by operation of the semantic network engine that is operable to semantically analyze data and establish semantic relations. The meta data engine may also use feedback on whether presented content is relevant or not to enable “self-tuning”.

[0152] The meta data engine also uses social interactions to determine what content and users the user determines to be important, and associated data may be dynamically added to the meta data engine. For example, input to the system can be used to determine the context of social items needed. Then, the meta data engine retrieves based on this context the social items needed from the social media utility, as well as the particular content associated with the social connections. This may be achieved by extracting summary items or keywords from content associated with the social connections. The summary items may be inserted for example into a social feed presented to a particular user as previously explained. If needed, summary items can be translated automatically by operation of the translation engine.

[0153] The translation engine is operable to automatically translate content between languages. The translation engine also accepts user feedback on specific words and phrases that more accurately convey an idea, and then uses user feedback for future translations. In one aspect of the invention, the audio may be extracted from video content, audio may be converted to text and then this text may be translated by the translation engine. The translation input may come from a variety of sources. In a particular aspect of translation by operation of the system of the present invention, there is a first stage in which the analysis utility determines the context of an information object to be translated, and this is used as initial input. The context may be different if a user is interacting from a mobile platform or is using instant messaging for example. The context provides clues as to how specific information should be interpreted which enables refinement of the translation process. Content specific libraries are then loaded and are based upon past user context to provide a translation that for the particular content and the particular user is likely to be more accurate. In one aspect of the invention therefore teaching content may be dynamically translated into a user’s native language.

[0154] The assessment utility or engine may provide metrics for users of the system as well as to the system with regards to how complete the knowledge of the user is of a particular component. The assessment engine may use meta data to determine the important topics within a course. In one aspect, the assessment engine and the content engine may cooperate to provide to a particular user a set of information objects that relate directly to their own weak knowledge areas. The assessment engine may communicate assessment data to users, and also data from the assessment engine may be used to dynamically highlight content in the web pages that may be of particular use to a particular user based on the assessment results.

[0155] The analysis utility combines the resources of other utilities or engines for example the meta data engine, the
semantic network engine, the assessment engine, and obtains data from the social media utility, and enhances their functions. The analysis utility uses meta data to determine relationships between users, and to determine relationships between content. The analysis utility links to other utilities to obtain user behaviour for example based on specific users taking notes in relation to specific content, analyzes discussions regarding content so as to obtain for example metrics for content creators to derive analytics as to what concepts or ideas are well understood and what concepts or ideas are not. This information may also be provided to the users themselves, for example students. The analysis utility is operable to develop profiles of users that are used by other engines to enhance their functionality. The analysis utility is operable to relate users to one another based on meta data. This may be based on similarity of background or ideas, or dissimilarity of background ideas. Based on the teaching objectives for example the analysis utility may suggest possible matches for smaller groups of students to work on projects, participate in smaller classes or online discussions and so on. The analysis utility is also operable to relate content to users based on meta data, assessment, and social engines. The analysis utility, in one aspect thereof, is operable to track and relate users to one another through common interaction with content, whether this interaction is direct or indirect.

[0156] In one aspect of the invention, the analysis utility includes a relational engine or component that collects data to identify or form relationships between users whether they’re directly or indirectly connected. A direct connection exists when users interact with related pieces of data. In each case a “fuzzy” understanding of relationships may be required at a broad level. The “fuzzy” understanding allows computational power to be saved where exact understanding would require intensive processing. For particular cases, a more precise understanding of relationship scores may be required and additional resources could be dedicated to that computation at that time.

[0157] The system of the present invention may define for each user meta data through all of the interactions in the system with content. The analysis utility may create a profile for a user, which is stored to the database, based on meta data associated with the user through content creation, interaction data from the social media utility, and interaction meta data in relation to the content or similar content. When for example a user seeks to input new content to the system (for example the addition of an information object that the user submits is relevant to another information object), this profile may be retrieved by the analysis utility. Meta Data graphs may be generated and then are overlapped to generate graphs where node strengths indicate how strongly users are related at a Data level. Relevant social relationships then further strengthen or weaken specific Nodes and Edges based upon past Interactions and the context Interactions. If the relevant users have not interacted directly through a course (weak interaction) or a discussion (strong interaction) then the Social Relationship mapping will have no effect, as it will be a NULL mapping. Weak Interactions, such as through a Course Interaction, are not as strong as Discussion Interaction and will weight upon the Nodes in a different manner. The Weightings are dynamic and stored in a Data format. The resulting Relation scores (one before the Social Map is applied and one after) is stored and can be used to determine similar users, dissimilar users, as well as what users are considered important from a social perspective. The difference in Relation scores determines the Social Importance and Relevance of users to each other.

[0158] It should also be understood that the analysis utility is further operable to relate specific content to users. Also content may be related to other content based for example on the meta data and social interactions. This can feed a much richer search capability within the web environment of the platform or linked to the platform.

[0159] Further possible functions and features of the assessment utility include the following. Assessment/Test Results may be input into the assessment engine. Associated content may be retrieved to obtain relevant content meta data in co-operation with the meta data engine. Also, tests can be dynamically generated using meta data from the meta data engine. With two maps of meta data it can now be determined what concepts and keywords a user has understanding of. A complete/definite/exact assessment is not necessary, rather unknown and common components are necessary so that related and known concepts can be used to generate greater understanding during presentation. An “understanding” map may be derived which may consist of a weighted graph where nodes record positive and negative values of “understanding”. Assessments may be recorded over time to generate a time based understanding graph.

[0160] Another aspect of the assessment utility is the creation of a course assessment. Much like the understanding of an individual user can be determined, a course or episode can be assessed to determine how well users understand a component thereof. By combining all test results an accurate map of understanding can be generated. Time based understanding graphs are also stored and this allows determination of how well users learn over time.

[0161] The web presentation utility is operable to present web interfaces and content to users by using information objects and data from the other engines. It is operable to highlight particular content to users, for example, as a result of the assessment utility, the web presentation utility may highlight specific content by changing the colour of links to specific content, enlarging the size of links to specific content, and so on. The web presentation utility is operable to conform content to users based upon various platform, user, and content meta data.

[0162] FIG. 5 further illustrates operation of the present invention, showing a possible workflow enabled by the content engine showing the dynamic creation or modification/ promotion/evaluation of text content. Text may be received or obtained as input and stored for use at a later date. Base content may be entered and the social media utility may be detect interaction with the input as context (for example an Episode, Course, Discussion, Notes, etc). Content, or selected portions thereof, may be translated into various languages and then stored by operation of the translation engine. Content may also be sent to the meta data engine to have a keyword graph assigned to it as further explained elsewhere.

[0163] In one aspect of the invention, the system may be operable to convert selected data to a standardized model in conjunction with the data type. The standardized model allows quick comparison and mapping of common data processing functions. This also aids in permitting ready translation of content by operation of the translation engine. This also supports the functions of the semantic network engine, including as it relates to creating context for incoming data and information objects, and determining the purpose of the
Introduction of data or information objects, for example because users can use different terminology and phrasing in different parts of the system.

[0164] In another aspect of the invention, as the data is translated to the standardized model, it may be assigned to a weighting map to increase or decrease the importance of particular pieces of data based upon previous interactions with the system, as best shown in FIG. 9. The weighting map can also be directly influenced by whether a content creator (such as a teacher) is assigning absolute importance to a topic. The weighting map is constantly refined and uses a feedback loop to determine importance of specific keywords. The weighting map is just one example of a function that may be implemented to the analysis utility.

[0165] Keyword importance can be determined through frequency of use, increase or decrease in frequency over period of time, increased or decreased relevance, length of word, relevance through dictionary searches, and a variety of dynamic factors.

[0166] After weighting, a standardized keyword graph may be generated that shows the importance of the Meta Data in relation to central data items as well as in relation to each other. The graph may have weighted edges and increases the value of highly connected nodes and nodes connected to valuable keywords.

[0167] Nodes determined to be of little value may then be trimmed. This may include common keywords such as “at”, “this”, or “the”. Words trimmed do not add value to the data model and the graph. Words may be trimmed in the context of the graph and not an absolute global view.

[0168] The graph may then be stored to the database as well as keyword scores generated from the graph. The graph and the keywords may be stored in the database or memory as performance requirements dictate.

[0169] Referring to FIGS. 6 and 7 certain functions of the social media utility are explained by way of example. The social media utility includes or is linked to a social engine for tracking interactions and extracting interactions in connection with the creation of content or modification/promotion/demotion of content.

[0170] Regarding FIG. 6 in particular social interactions come from a variety of sources including messaging another user, responding to a discussion, creating notes based on content, participating in groups, and even an interaction as simple as course participation. Each interaction may be stored immediately for record keeping and for use by the other engines or utilities. The participants in each interaction may be extracted. The relative importance of an interaction is determined and then used to increase or decrease a relationship score. The context of an interaction is important as a single reply to a discussion may not increase a relationship score greatly but repeated interaction in a discussion by the same participants strengthens their bond. The meta data engine is provided information on the interaction as well as keywords associated with the participants. The keywords may be assigned higher scores by the system as the user has shown indication as to the importance. The participants’ relationship graphs are also updated and stored for future use in generation of presentation elements or other information objects, including for use by the analysis utility.

[0171] Regarding FIG. 7, the social media utility accepts either general data requests that result in all interactions being returned or filtered data requests that filters the results. Interactions, which were stored immediately, may be returned and then filters are assigned which may remove interactions based upon importance of filter data to participants. Specific interactions can be requested and an example would be for use on a Course Social Feed that would result only in interactions relevant to a particular course being shown.

[0172] Referring to FIG. 8 certain other functions of the meta data engine are shown by way of example, in this case in connection with the use of the meta data engine for searching for relevant content. The initial phases as described in the preceding section may be initiated, and then incoming searches based on keywords or content may be used to generate a graph to show relative importance of incoming content. After the trimming of nodes the remaining nodes may be used to search through the keywords stored. Higher scores point to relevant content and with multiple keywords an overlap in scores results in a resulting higher importance for a search result. Since the graph nodes are connected by weighted edges, content can be cross-referenced even if a particular keyword is not found specifically.

[0173] FIG. 10 illustrates the resources that of the E-learning platform of the invention, as provided to user who logs in to the system, from the perspective of a user who compiles content, such as for example a teacher. The various resources described above are displayed in FIG. 10, including for example management of courses, and related forms, management of episodes part of the courses, management of groups and associated forms, and management of assessments.

[0174] FIG. 11 illustrates a possible implementation of the present invention and shows the administrative resources that may be associated with an administrative user of the platform of the present invention. One set of functions relate to settings, and another set of functions related to management of content creation and delivery, including based on engagement of users.

[0175] In another aspect of the invention, the invention allows for teacher content creation and delivery to be funded from sponsorship fees or advertising as decided by the teacher or source organization, which may be a University, government agency or private corporation. The analytics utility can input user meta data and user profile data to target advertising based on a wide range of user attributes and demographic information, such as location, language, interests or metadata profile. The E-learning platform can import targeted advertising video clips prior to or following the video teaching content viewing by a student. The E-learning platform can also overlay a fixed or changing themed styling which may include the sponsor’s logo, message, and corporate branding onto the viewing platform. The ad engine, as mentioned previously, can be used to place ads within the content.

[0176] The E-learning platform can be linked with third party systems such as Facebook™ for example to post courses and statistics regarding student participation and interaction with specific course materials.

Advantages

[0177] Numerous of the advantages of the invention have already been highlighted.

[0178] The system of the present invention collects metadata based on the users’ background, usage patterns/consumption and peer usage patterns/consumption and models relevant learning material and then identifies, tags this metadata to specific points in time for example in video content to further customize content not just to the user and to the content (in this case the video content) but also to concepts
being covered at a specific point in time during the course of the video being played. This notion of time sensitive presentation of related content can be applied to other types of content and other workflows enabled by the present invention.

Furthermore the presentation of content including related content can be customized to the user based on various attributes of the user including location (country, city, university), educational preferences and needs (defined in an initial profile), language, peer group and individual searching patterns. This further enhances the relevance of the content to the user, and also avoids for example culturally insensitive content being presented to a user.

The present invention provides a dynamic, intelligent E-learning platform that provides students a customized view of material using filters that organize and populate a framework of knowledge with information and digital media content including video, sound, images, and real time internet content.

The present invention improves on prior art systems in providing a high degree of flexibility as to not only when content is consumed, but also from what type of device. The meta data collected and analyzed by the invention, based on unique aspects of the invention enable the dynamic creation of content derivatives such as summarized documents or summarized interactions that can be more readily consumed on a mobile device for example.

The system of the invention can include or be linked to full archival capabilities and interactive tools, and therefore become for example a key corporate asset.

The system is ideal for delivering education and creating dialogue on company specific issues, for generating ideas on continuous improvement and for monitoring and enforcing the learning requirements that companies require. It also provides an effective corporate communications tool to create and deliver corporate messaging, operational information or even showcase events.

As users contribute content to the system, these contributions can be archived and reviewed by other employees or shared to ensure greater reach of important company themes and initiatives.

The company has the choice to expand the content easily by importing course content from a library associated with the system or by ordering from the outside, all organized from a central administrative point. This material can be open to new dynamic material or such material limited by the administrator/content creator. For international companies the translation features combined with the social networking/discussion groups features allow centralized companies to form collaboration teams and discussion groups around accessing specific course material.

Users access the course material at a time and place that is convenient to the user and doesn’t interrupt their normal work schedule. It allows for study groups to study common course material together without having to meet face-to-face and allows better observation by supervisors of employee interaction and participation for reviews.

The system is designed as an ongoing learning platform that can continue to provide contextual based discussions among users, even after the course content has been consumed. Whereby users can purchase further courses and share their learning experiences or outside knowledge material with existing discussion groups, spawning ever continuing discussions.

The system of the present invention provides greater flexibility to students to consume content in a way that fits best with their learning, including for specific knowledge. For example, a student if s/he having trouble understanding a specific concept s/he may (a) pause a video, (b) read background material, (c) find student interactions involving one or more students who had trouble with the same product and perhaps explain the concept in ways most useful to the student, (d) may do additional independent searching and review, (e) may seek translation of selected content if that translation is not already available, (f) may “ask a friend” for information regarding that concept through Internet chat for example. After the student has obtained the knowledge s/he desire, s/he may return to the lecture and will as a result learn more from the subsequent content.

The system provides significant benefits to students, enabling them to quickly and easily extract, and organize, and save to a web area associated with them, specific information objects or selection thereof that are relevant to them. This make this process of summarizing information, analyzing information, and storing information for repeated review much more efficient, and therefore aids in improving learning results.

The present invention feeds the desire of individuals to continue learning constantly, providing on demand access to education in a form that meets or exceeds the educational value or more traditional instruction.

The present invention improves student retention in specific courses because students are more engaged with the content and with one another and their teachers.

Significantly, content managed or created using the system of the present invention becomes dynamic, more up to date and more relevant to students in part because in many cases students are influenced by their peers, and by operation of the present system interactions by peers with the teacher, with content, are available for others to view, to model, and to learn from.

The present invention enables content to be enriched by interactions and learning from past courses. The collective wisdom or new ideas that sometimes emerge from the unique combination of a particular group of individuals, interacting with one another, and interacting with content is sometimes difficult to transfer to a new group because time constraints on teachers and possibly different teachers taking on different courses. The present system enables the “best” content or interactions from one situation to survive by being dynamically transferred to a subsequent class. In fact such content and interactions can be transferred by the system from one class to a completely different class to enable cross-pollination of ideas and learning, and to enable multi-disciplinary learning. In one implementation of the invention, this aspect could be leveraged to encourage more efficient research or product development by dynamically linking activities that may be interrelated and deliver value to one another.

It should be understood that the present invention is operable to provide deeper knowledge regarding the attitudes of users in part because the system is operable to identify, compile and analyze how users relate to specific content, and thereby to specific themes and ideas covered by such content.

The present invention enables quick and cost effective expansion of teaching output, especially to address growing demand in countries such as China or India for educational content, especially from particular institutions with recognized expertise in certain areas.
Further Implementations

[0196] It will be appreciated by those skilled in the art that other variations of the embodiments described herein may also be practiced without departing from the scope of the invention. Other modifications are therefore possible. It should be understood that the present invention may be implemented in a number of different ways, using different collaborative technologies, data frameworks, mobile technologies, web presentiment technologies, content enhancement tools, document summarization tools, translation techniques and technologies, semantic tools, data modeling tools, communication technologies, web technologies, and so on. The present technology could also be integrated into one or more of such third party technologies, or such third party technologies could be modified to include the functionality described in this invention.

1. A computer implemented system for providing an intelligent collaborative content infrastructure, characterized in that the system comprises:

(a) one or more computers including or being linked to a server computer, the server computer implementing a server application, the server application defining an intelligent collaborative content management utility, the intelligent collaborative content management utility being operable to:

(b) manage a library of digital content items, and enable one or more users to access the digital content items;

(c) capture and analyze (i) feedback from users regarding the digital content items, and (ii) interactions between users regarding the digital content items, and

(d) based on the analysis of (b), dynamically create, assemble, modify, promote, or demote content, so as to generate collaborative digital content.

2. The computer implemented system of claim 1, characterized in that the server application is operable to enable the dynamic modification and/or customization of one or more of the digital content items based on the feedback and/or interactions.

3. The computer implemented system of claim 1, characterized in that the server computer includes or is linked to one or more social media utilities for monitoring social media interactions between users relevant to the digital content items.

4. The computer implemented system of claim 3, characterized in that the server computer further includes or is linked to an analysis utility, wherein the analysis utility is linked to the one or more social media utilities in order to enable the capture and analysis of social media interactions between users that relate to one or more particular digital content items.

5. The computer implemented system of claim 1, characterized in that the server application includes, or the server computer is linked to a semantic network engine, linked to the analysis utility, for enabling the semantic analysis of the feedback of users and/or the interactions between the users.

6. The computer implemented system of claim 5, characterized in that the analysis utility is operable to monitor feedback provided by one or more users regarding particular digital content items and/or the taking of notes by one or more users regarding particular digital content items using a note taking tool of the server application, or linked to the server computer.

7. The computer implemented system of claim 4, characterized in that the analysis utility is operable to define one or more attributes for a plurality of users, including demographic and/or location data, and the analysis utility is operable to interoperate with the content management utility so as to customize the digital content items based on such demographic and/or location data.

8. The computer implemented system of claim 4, characterized in that the one or more digital content items constitute educational content, and the analysis utility is operable to define one or more educational milestones or objectives, and monitor one or more users' progress in using the content management utility against such milestones or objectives.

9. The computer implemented system of claim 8, characterized in that the analysis utility is operable to identify one or more students that are not meeting the educational milestones or objectives, and suggest content and/or instructor interactions for such one or more students.

10. The computer implemented system of claim 9, characterized in that the analysis utility embodies one or more assessment tools, the assessment tools being operable to receive input from one or more students, and/or to receive performance data for one or more students relative to educational milestones or objectives, and based on such input or data generate a learning assessment for the one or more students.

11. The computer implemented system of claim 10, characterized in that the content management utility is operable to identify and retrieve digital content items, or modify digital content items dynamically, so as to produce digital content items in response to results of the learning assessment.

12. The computer implemented system of claim 1, characterized in that the analysis utility is operable to monitor learning activities of users, and based on such learning activities identify shared learning attributes amongst two or more users, and based on such shared learning attributes the analysis utility being operable to suggest that the two or more users form a study group, using the social media utilities.

13. The computer implemented system of claim 1, characterized in that the server computer further implements a digital content item creation utility, the digital content item creation utility being operable to enable one or more users to assemble audio/video content, and to highlight one or more key concepts, the digital content item creation utility being operable to tag the audio/video content with the one or more key concepts.

14. The computer implemented system of claim 1, characterized in that the server computer is operable to search for and locate digital content items from one or more databases connected to the server computer, or remote from the server computer, based on the feedback or interactions of the users.

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