Enhancement of Conception and Embedding the Enterprise Social Network in Academy Information Space

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Abstract. Application possibilities and toolkit modern social networks are considered in view of the established criteria for the deployment of cross-academy online media platform. The necessity of original enterprise social networking with mechanisms of introduction into ramified academic information environment with educational department involvement and full coverage of provided educational services is substantiated. Factors for the organization of an educational community platform have been proposed, for which the existing information flows have been structured and adapted to meet the needs of key academic hyper-entities. This made it possible to construct personalized notification content tuples for the predetermined categories of individual profiles as a basis for toolkit of targeted messages routed by addressing mechanism. Thus, a hierarchical community isolation toolkit was introduced, and a mechanism for distributing the weight of communities was configured, based on which a mathematical model of targeting messages priority for identified user was concluded. A conceptual scheme of the academic community platform functioning was developed, which covers and analyzes the data flows of main departments of educational institution and solves the problems of organization and information support for the learning process.

Keywords: academy community platform, enterprise social network, online service, targeted message, educational information space.

1 Introduction

The scientific and educational space of a modern academic institution is designed to provide quality pedagogical services in the training of qualified specialists. It is advisable to establish social relations between subjects of educational process with use of a unified online platform with common but profiled access to learning means adopted by academic establishment and entities of study stages.

The concept of social media focuses primarily on the sharing of knowledge and ideas, delivering to separate communities the communication facilities with online access through personal mobile gadgets. The functionality of prevalent social networking is focused primarily on information dissemination, communication and sharing, thus representing a variety typological clusters without targeting the content offered and data availability scripts.

Much attention, which is paid to modern commercial networks, their intense advertising, the hype surrounding the rollout of new technologies and other, not always moral, factors support young people's high interest in the ever-changing functionality of such web services. The desire to explore the innovations involved, improve with the help of them own status in network community and capture a more third-party accounts leads to a permanent increase in the amount of time spent in online environments [1]. In this case, the user haphazardly consumes unnecessary and sometimes harmful information, which prevents him to focus on a significant part of his interests and carry out constructive creative work.

In addition to these negative trends, the absolute advantage of social media is their ease of use, prevailing interface friendliness, provided mechanisms for creating a customized environment, flexible coexistence of communities of various topics and nomenclature. It is also necessary to note the services of receiving the subscription content, saving it, commenting and distributing it. Acquiring experience of formulating one's own opinion and expressing it in writing, and thus spreading the author's works in other informational form, promotes personal affirmation, satisfaction of creative ambitions and cooperation between like-minded people.

The typical mechanisms of modern social networks allow to support professional interest in the speciality by senior colleagues, graduates, potential employers and other key stakeholders, adjust the directions of scientific work and make optimal decisions on further learning, provide the opportunity to participate in constructive discussions on campus issues and develop networking issues.

2 Experience of World Scientists

Attempts to identify of pedagogical toolkit in of social networks landscape have been reflected in the research of many scientists. So, measures to maximized of used profile potential of the corporate process entities in social networks and influence on social values [2] are highlighted by *David McConnell*, *Vivien Hodgson* and *Lone Dirckinck-Holmfeld*. Practical experience in using popular among students and teachers of social media for promote library holdings is discussed in [3, 4]: *Nina Verishagen* and *Molly Flaspohler* showcased new approaches from higher education institutions to increase user engagement and expanding connections with the campus community through students who are active visitors to the academic library.

Considering commercial social media as an integral component of higher school teaching and learning, *Stefania Manca*, *Maria Ranieri* and *Gökçe Akçayır* acknowledge the negative nuances of accepting them in teaching because of cultural resistance, pedagogical problems, and institutional constraints [5-7]. University of Ken-

tucky and North Central College staffs note that students use their social media accounts for lack because of the lack of an appropriate toolkit in current learning management systems [8]. Practice individual moments of self-regulated online learning in non-formal learning spaces of disseminated enterprise networks is reflected in thematic analysis of Northwestern [9] and Binghamton [10] Universities scientists.

Alexander Yong Su Pohl and *François Bry* from Munich [11], *Kristine Ludvigsen* and *Ingunn Johanne Ness* from Bergen [12, 13] spread the idea of social media platforms in the form of public screens or feedback wallpapers for interactive visual communication of large lecture classroom, however, emphasizing the compulsory blend of such innovative ideas with traditional educational courses used by learning management systems. The direct and rigid dependence of media effectiveness in the search for scientific resources as socio-technical capital from the orientation of editors on a key subject area [14] is evidenced by *Daniel Suthers*. *Nada Dabbagh*, *Anastasia Kitsantas*, *Orven Llantos* and *Maria Estuar* they seek to conceptualize the connection between the personal learning environment and social media and distinguish between the technological and pedagogical foundations for developing self-regulated learning skills [15, 16].

In general, this presented analysis of existing sources of the last decade and performed by authors researching show that every public decentralized social platform has its limitations in realizing educational potential, focusing on the social needs of segregated users. These publicly available online media environment offer a variety of functionality with either common or exclusive technical specifications and in today's world of high technology, they are mostly used to communicate privately or promote ideas and businesses to attract attention a wide users range.

However, none of the common web services, generally poorly structured, does not provide a comprehensive solution for the full organization and contextual support of classroom activities, hierarchical profiled access to confidential faculties fonds and professional-oriented editions of the academic library collection, automated analysis of acquired competences based on the results of operational knowledge control and appropriate target and situational informed of the subjects of the educational process. Therefore, designing the original enterprise social network with its further organic integration into the academic information space for full coverage of educational services was timely and relevant to the effective dissemination of contexted methodical support, to operational document flow and resolving issues of evaluating the activity results of authorized entity in learning process.

3 Structuring and Personalization of Academic Information Flows

To design a self-targeted social networks with optimal use of resources of academic information space must first specify system requirements of determination of effective relationships between entities of the educational process. The prevalence of mobile gadgets allows you to quickly use them to process information flows by recipients, who authorized in academic space [17]. As a result of authorization, such recipi-

ents are identified as one of the academic hyper-entities: *teacher* (***T***) or *student* (***S***). The main data exchange in the academic community platform is centered around such a unit of pedagogical process as a academic discipline. The basic criterion for organization of enterprise social network in higher education institution is the structure of information flows, among which it is decided to single out the educational *content*, educational *documentation* and *instructions* for implementation or corrections.

Thus, a teacher at the distribution of educational content ***Cn*** providing links to the library *Lib* or collection of faculties funds *FF*, pre-indexed in the academic knowledge base [18] and marked for the discipline and the specific forms of educational process. Having received the links in the profile of the enterprise social network that make up the meaningful part of the educational and methodical support [19], the student as a listener of the discipline can view personally selected targeted content, which is automatically displayed on the terminal of the academic educational space. Educational content prepared by the student *ScP* in the form of scientific creativity, coursework and diploma design, after having passed the check for the content of plagiarism, is placed on the closed academic cloud storage, the link from which comes to the teacher (1):

$$Cn=\{T\ \{Lib,\ FF\},\ S\ \{ScP\}\} \tag{1}$$

After analyzing the completed work, the teacher makes a decision on the evaluation of the author's contribution and gives permission to attach it to the academic repository of student's works, or sends a notification of revision. In this case, the student automatically switches to his work on the cloud with the edits and remarks of the teacher for further processing.

A cumulative score obtained from a scientific work, current activity, control measure, etc. according to the rating distribution of points accepted in a higher education institution, is recorded in the student rating table in the academic database [19, 20], and is displayed in the progress register *PrR* as a fact of fixing the performance of the benchmark academic load of the current discipline. In addition to this credentials logbook, the teacher's ***LDoc*** learning documentation includes *PrSh* information as a summary of overall performance. On changes in the documents of strict accountability, as well as in individual student curriculum enterprise network sends the message to the appropriate profiles involved. On the part of the student, the educational documentation includes various reports on the implementation of the unit of load according *StR* to the accepted in the institution template (2):

$$LDoc=\{T\ \{PrR,\ PrSh\},\ S\ \{StR\}\} \tag{2}$$

Information streams from the instruction category ***Inst*** are sent to the social network by the teacher directly via text arrays in the form of instructions for the implementation of training exercises *Ts* and targeted consultation *Adv* in the chat mode, where the student raises constructive questions *Qs*, having difficulty in solving problems independently. Also, chatting between students engages in business communication *Is*, as between members of one community (3):

$$Inst=\{T\ \{Ts,\ Adv\},\ S\ \{Qs,\ Is\ \}\} \tag{3}$$

Thus, the projected academic social network provides a toolkit for sending targeted structured messages that are automatically displayed in the profile of a specific end user in the form of links to relevant content, change cumulative score, closing training information. The original mechanism of addressing the academic profile is routing messages and targeted delivery of them to the entities of the educational process, centered around the discipline. Depending on the curriculum, schedule, regulations and other factors, the relevant profiles are automatically alerted to the postponement, cancellation, replacement of classes, reminders of control measures. Students in doubtful academic records receive confidential announcements about the retake of academic units: the teacher only determines the date, and the routing mechanism according to the student rating table provided by the analytical apparatus of the academic space determines the final subscriber. Other members of the social network will not see this notification.

4   Target Priority Message Modeling

Another original criterion for organizing a projected enterprise social network in a higher education institution is the ability to flexibly distribute existing students to target communities: academic groups, interest societies, student fraternities, covey to pay off academic debt, etc. Unlike the widespread commercial social networks, the academic social network should provide the most automated toolkit for hierarchical isolation of such communities based on classroom training.

For example, individual members of a fixed community, such as an academic group of a particular educational and professional program, provide laboratory documentation or seminars with separate teaching assistants, with a single lecturer. Also, some students study a separate foreign language, forming separate societies with some members of other established communities, in which the structure of information flows is further supported by the models (1) - (3) routing targeted private or public messages by the described addressing mechanism. As a result, users of the academic community platform connect with other users in the workspace, forming a new spontaneous community.

Thus, using the social network database management system user identifier, the addressing mechanism provides the analytics apparatus with a list of user communities involved. This list is sorted by a number of key parameters processed in milliseconds, taking into account the maximum date Tg_{max} given by Unix Time. This takes into account the date of creation of the current community Gr_{crt} and the date of publication of the last unread message T_{lm} in the community. Separate criteria T_{adlm} decided to allocate to indicate the date of publication of the last message did not see anyone from the community administrator. It should be noted here that, for academic community groups, the hierarchical administrator is the group supervisor or group leader; for disciplinary communities teacher-lecturer and lower in the hierarchy teachers-assistants. For other types of communities, community initiators are administrators; it also provides a toolkit for assigning a hierarchical priority to administrators. The importance of messaging g_k increases depending on the importance of the fixed commu-

nity in the academic process, ranging from covey debt repayment and disciplinary community across academic group communities and ending with diverse interest societies. Thus, the sorting priority of the message S_{koef} for the community profile, taking into account the detail factor k_z, provides a calculation of the weight of the current community (4):

$$S_{koef} = \left[\left(1 - \frac{Gr_{crt}}{Tg_{max}}\right) \times k_z\right] + \left[\left(1 - \frac{T_{lm}}{Tg_{max}}\right) \times k_z\right] + \left\{\left[\left(1 - \frac{T_{adlm}}{Tg_{max}}\right) \times k_z\right] \times g_k\right\} \quad (4)$$

If the student-selected community is a disciplinary community, the resulting array of message objects is structured into priority subarray of messages from the discipline's teachers (3) in the form of a list of tasks Ts and consultations Adv. Also special attention to the organization of self-regulated learning in individual-oriented informal student cyberspace attracts an array of constructive messages Is to other students - members of the disciplinary community; in particular, brigade communities can be distinguished as a subset of students from an academic group working together on a single learning project. Inside each sub-array, messages are sorted by date of writing in ascending order. The result is a new two-dimensional array of message objects that are transmitted to the user's end-terminal to display [18, 20].

When with the disciplinary community work a teacher-assistant, in his profile most priority is a sub array of consulting requests of students Qs and their messages with links to file StR, that are reports of laboratory or practical tasks, that was loaded in a closed academic desktop. As noted, such files form the rigorous reporting of training records and are stored for a long time in accordance with the archiving requirements of the learning outcomes accepted by the educational establishment. Therefore, after the evaluation, they are automatically transferred to the digital archive of the Academy and after the storage time end the analytical unit of the designed social network will send the administrator a form for their destruction.

Teacher-lecturer, given expanded powers, in addition to the information category of teacher assistant also receives high priority links to files of student scientific design ScP, the authors temporarily located on the virtual desktop.

For other types of communities, grouping is done by the importance of the message g_k specified by the administrator (4). The sorting of the message group is performed in ascending order of the message creation date.

5 Conceptual Model of Functioning of the Academic Community Platform

The developed mathematical models (1) - (4) are the basis of the projected academic community platform, which focuses on the administration of messages in the organization of inter-entity communication and interaction with the educational information space of the institution. Subject area learning process created and supported data flows between key nodes of the educational process, concordant application program interface means.

An authenticated user in the end terminal of his profile is provided with toolkit for the implementation of educational services (Fig. 1). Using connection between community identifier and user identifier, the server initiates a request to MESSAGE BASE to retrieve a list of messages from the current community. Therefore, the automatic authentication of messages from USER API profiles performs the described addressing mechanism, determining the user identificators that are associated with the received messages.
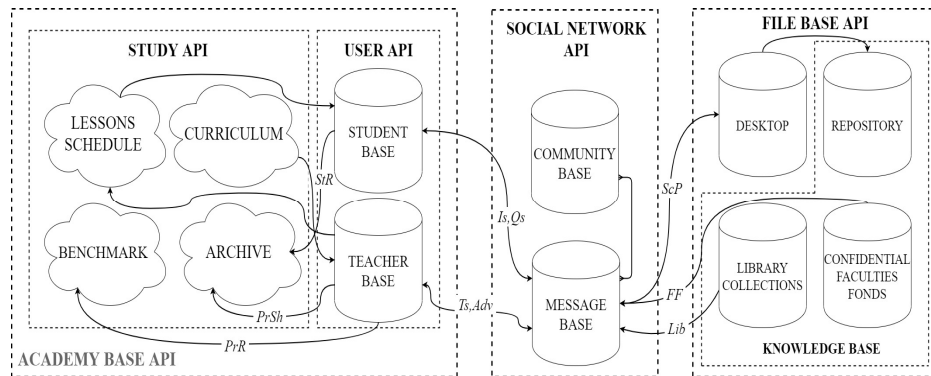

Fig. 1. Conceptual scheme of the academic community platform functioning

The COMMUNITY BASE component contains a list of communities associated with a cross-academy online media platform participant. Using available tooltip, a member of the current community detects notifications from other communities. STUDENT BASE and TEACHER BASE contain members of all fixed communities, including disciplines identified by roles in the script of the educational process according to the conditioned hyper entities.

The main information flows are circulating in the STUDY API cluster of academic cyberspace. The rules for structuring units by topic are compiled in the CURRICULUM component. Situational message about informing the content of the next lesson for the entities *student* of the current disciplinary community will automatically deliver a collection of links to the relevant topic from the files of LIBRARY COLLECTION or CONFIDENTIAL FACULTIES FONDS. Selected fragments of structured methodical support are displayed at the user's end terminal. Also, the profile of the teacher education process specific form automatically TEACHER BASE send a message directly to the objectives and consistency of execution.

A situational software engine deliveries in most academic community is a component LESSONS SCHEDULE. It contains a list of classes as a form of educational process with reference to the date and time of their implementation in accordance with the regulations of classes taken in an institution of higher education. If the teacher or classroom needs to be replaced, the described situation analysis mechanism generates an appropriate notification that the addressing mechanism later delivers to the target profiles.

As mentioned, when performing a task on a specific topic, the student profile provides toolkit to obtain additional information from the teacher of the support of appropriate form of the educational process. In this case, from the MESSAGE BASE component comes targeted messages for the TEACHER BASE profile, identified in COMMUNITY BASE. Extensive consultation provides toolkit for mass discussion of the problem with the involvement of other teachers of the current community, as well as teachers of related specialties.

Also described is the possibility of business communication within a subcommunity, isolated in a fixed community, allows a constructive with maximum efficiency to conduct a study of a separate laboratory stand. In doing so, STUDENT BASE identifies subcommunity members using the connective of a community identifier and a user identifier initiated by a network server.

After completing the benchmark training load of the current discipline, the student-prepared reports are temporarily housed in the academic cloud repository represented by the DESKTOP component, with the simultaneous automatic targeted informing of the relevant teacher of laboratory or practical lesson [19]. If the report is performance fully protected, the BENCHMARK component controlled by the STUDY API cluster receives a cumulative score from the teacher as the weight of the task completed, provided by CURRICULUM. At the same time, the prepared materials are automatically moved from DESKTOP to the ARCHIVE component of the same cluster.

Written works prepared by students, which require active creative activity and demonstration of technical and technological proficiency and skills [21, 22], independent expansion of the scientific worldview [17], as well as large-scale course projects require more detailed examination and evaluation. After going through all the stages, review and defenses, the verified work is moved to a permanent cloud repository, represented by the REPOSITORY component, and joins the academy KNOWLEDGE BASE in FILE BASE API cluster. It should be noted that, like library collection and confidential faculties, as a methodical provision, the content of the repository is structured for further indexing, parsing, and convenient processing by academy community platform recipients, while enhancing the professional intellectual capital of a higher education establishment.

6   Conclusions

Thus, the designed enterprise social network, which is organically integrated into the academic information space, is suitable for capturing and analyzing the data flows of the main departments of the educational institution and promptly solves the informal tasks of information support of the educational process. Dedicated entity classes of academy space have become decisive in creating a hierarchy of key community platform profiles and have set the structure and mechanisms for personalized toolkit interaction.

The concept of circulating in cyberspace not bulky files of pedagogical content, but only messages with links to relevant parts of the methodical support or the results

of student scientific creativity from the academic repository, will significantly reduce the load on the computational resources of academic servers and realize unambiguous targeted access to volumetric arrays of structured data. An effective mechanism for hierarchical distribution and dynamic separation of social groups within the cross-academic community provides the computation of the targeted messages priority for the identified user in order to provide timely and quality educational services in the training of qualified professionals. The proposed conceptual scheme for the unified academic community platform functioning supports automated document flow with coverage of typical scripts and forms of educational process adopted in higher education institutions, making optimal use of educational information space resources.

Further research into the development of the enterprise social network of a higher education institution it is advisable to concentrate on the allocation of a separate hyper-entity of the *administrative staff* of main departments to serve the predefined data flows taking into account the performance and then expanding of nested profiles. The refinement and expansion of the developed web-based toolkit will allow such profiles to accelerate the primary stages of administrative activity in the analysis of reporting and planning of educational and educative activities for the student of the classroom form of training, and for the distance form it will facilitate situational informing and purposeful delivery of learning-support documentation.

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7   References

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