
Askalot: Community Question Answering as a Means for Knowledge Sharing in an Educational Organization

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Abstract

Community Question Answering (CQA) is a well-known example of a knowledge management system for effective knowledge sharing in open online communities. In spite of the increasing research effort in recent years, the beneficial effects of CQA systems have not been fully discovered in organizational and educational environments yet. We present a novel concept of an organization-wide educational CQA system that fills the gap between open and too restricted class communities of learners. In order to evaluate its feasibility, we designed CQA system Askalot. Askalot was experimentally evaluated during a summer term at our university with more than 600 users. The results of the experiment provide an insight into employment of CQA systems as nontraditional learning environments that utilize a diversity of students' knowledge in a whole organization.

Author Keywords

Askalot; Community Question Answering; Knowledge Sharing; Collaborative Learning

ACM Classification Keywords

H.5.3. Information Interfaces presentation: Group and Organization Interfaces; K.3.1. Computers and Education: Computer Uses in Education.

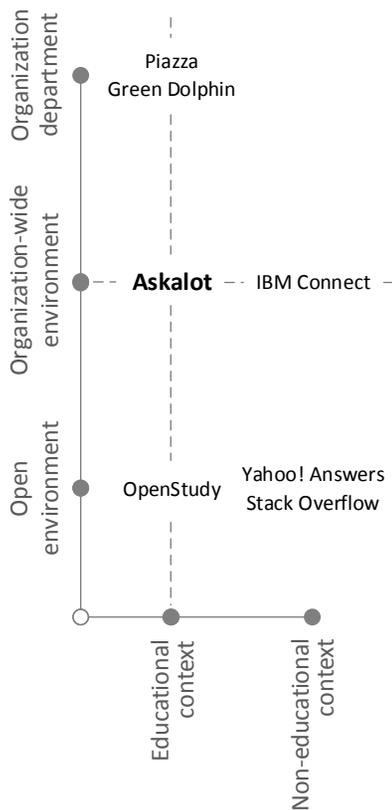


Figure 1. Askalot in the context of existing CQA systems. What makes our system Askalot unique is its explicit dedication to a whole organization while existing solutions focus either on open environments or on single classes that correspond to organization departments.

Introduction

Community Question Answering (CQA) systems, such as Yahoo! Answers, have already become valuable repositories of knowledge captured in millions of question-answer pairs. As the result of the growing popularity of CQA systems, their concepts have been already applied in various communities and environments. To provide an overview of their diverse application, we can divide CQA systems according to two dimensions (see Figure 1). At first, we determine a context where they are applied in as non-educational and educational. Secondly, we distinguish three types of environments: an open environment, an organization-wide environment and an organization department.

CQA systems in the non-educational context appear especially in the open Web (e.g. Yahoo! Answers or Stack Overflow). Besides them, CQA systems have been already applied also in purely organization-wide environments, e.g. in enterprise social CQA systems, such as IBM Connect [3].

CQA systems in the educational context focus either on open communities or closed groups of students who enrolled for the same class. One of the advantages of open communities (such as OpenStudy [4]) is a great number of participating users. In spite of that, students can have a lot of questions that are context-dependent or even about organizational matters (e.g. a question related to specific learning materials) and thus they cannot be answered easily and effectively by students outside the same organization. This problem is solved by class-wide CQA systems (such as Green Dolphin [1]), nevertheless their community can be too restricted as they involve only students with approximately the same level of expertise. We stress that true knowledge

sharing is likely to occur especially in communities that involve diverse students from different classes, grades or study degrees, nevertheless we are not aware of any such system. Therefore, we consider the gap between open and too restricted class communities of learners as an opportunity to develop a novel concept of an *organization-wide educational CQA system*. To describe this concept in more details and to verify its feasibility, we proposed and implemented a CQA system Askalot (<https://askalot.fiit.stuba.sk/demo>).

Overview of Essential Askalot Features

We divided the main features provided by Askalot into five categories according to [2]. These categories represent high-level functions that are essential for successful collaborative learning and knowledge sharing.

Dialogue and Action. The core of Askalot consists of necessary tools for the question answering process itself. While creating a new question, students are asked to select its category (categories corresponds to classes and their internal organization, e.g. lectures, seminars, assignments) and tags (tags reflect particular topics of questions' content, e.g. keywords describing the problem to be solved). From the knowledge management perspective, this unique two-level topic hierarchy represents an important aspect in the system's proposal. It allows a high scalability for the whole organization as an inclusion of a new class is really simple. It is necessary to define only categories that reflect the organization of the class while students themselves create a folksonomy of topics by assigning tags to questions. To encourage students in asking questions also in cases when they are not sure about their correctness, there is an opportunity to ask a question anonymously. As soon as the question is posted, stu-

In the proposal of Askalot, we took into consideration:

- Learning potential embedded in the question answering process (described in our previous work [5]).
- Organizational specifics (e.g. lower number of users, users' familiarity).
- Educational specifics (e.g. presence of a teacher, different levels of students' knowledge).
- Our previous experience with application of knowledge management concepts in the educational domain [6].

dents are able to post their answers, vote on them, add comments on questions as well as answers and favorite questions similarly as in standard open CQA systems.

Teachers' Assistance. Askalot fully takes an advantage of the teachers' presence. Teachers can ask new questions and provide answers similarly as students do. In addition, teachers are able to evaluate each question or answer at a 5-points scale with an additional possibility to attach a comment (see Figure 2). The primary purpose of this evaluation is to explicitly motivate students to provide high-quality answers with a detailed explanation and references on external sources that supplement their answers. Askalot is also integrated with a startup sli.do which enables localized real-time question answering during lectures. Finally, detailed statistics describe the current state of the question answering process either for the whole community or for the particular students.

Workspace Awareness. In order to effectively follow activities in Askalot (e.g. a new post, a best answer selection, or a modification of an existing post) all users can decide to watch various systems' artefacts (i.e. categories, tags and questions). Notifications are sent when any important activity happens in their scope. In addition, when a user joins a question answering thread, the corresponding question becomes automatically watched. Besides notifications, an activity feed provides an overview of either all activities performed in the system or only those activities that have been carried out by user's followees (e.g. close classmates).

Students' Self-regulation or Guidance. We are aware that it is important to reward and guide students to actively participate in knowledge sharing as students might tend to protect their knowledge. This kind of problem is actually well-known in many organizational knowledge management systems. Besides students' intrinsic motivation, especially a positive community feedback and teachers' evaluation represent the additional extrinsic motivational factors.

Community Level Management. The last group of functions concerns with management of activities and content across the whole community. Askalot provides users with several ways how to navigate in and work with community knowledge: by classes and their structure (categories), by topics (tags) or by fulltext search.

Askalot in Research

Besides Askalot primary dedication to support collaboration among students, Askalot can be characterized also as an open platform that is suitable to develop and validate various adaptive methods for supporting effective knowledge management and knowledge sharing.

The question was evaluated by a teacher as a good one.

The teacher's contribution is highlighted with a different background to be easily distinguished from the content provided by students.

The answer was selected as the best.

The screenshot shows a question titled "Model vs diagram" with tags "PSI-unit", "psi", "uml", "diagram", and "model". The question is from user "cimox" (Matus Cimerman) and was added on May 3, 2014. It has 1 answer. The answer is from user "mariabelik" (Maria Bielkova) and was added on May 13, 2014. The answer is highlighted with a green background and a checkmark icon. The question text is: "I am not sure whether I understand correctly the difference between a model and a diagram. I think that there is a mistake in the sample project at the page 12 and 13, isn't it? I suppose that 'Use case diagram' should be used instead of 'Use case model'. Thank you." The answer text is: "Yes, it is a mistake and the correct caption of the image should contain a diagram as the image contains 'only' the graphical representation of particular model artefacts. In comparison with a diagram, a model contains also a description of these artefacts, the relationships among them together with the reasons that lead to the decisions captured by the model."

Figure 2: Screenshot of a question detail in Askalot.

Metric	Value
Number of students	591
Number of teachers	11
Number of questions	256
Number of answers	183

Table 1. Statistics of Askalot experimental evaluation as a supplementary tool to the formal educational process during the summer term 2013/2014 at the bachelor degree, Faculty of Informatics and Information Technologies at Slovak University of Technology.

Metric	Askalot	SO
% of solved questions	48.6	57.2
% of questions with at least 1 answer	92.9	88.3
% of users with at least 1 question	10.9	41.8
% of users with at least 1 answer	13.4	27.1
% of users with at least 1 comment	7.7	33.5
% of users with at least 1 vote	36.7	15.9

Table 2. Comparison of features describing the question answering process in Askalot and Stack Overflow (SO, data until the end of December 2014 were considered).

We built up a software infrastructure that allows researchers to employ various methods to model students (e.g. their expertise level, interests) as well as content (e.g. quality of questions and answers, assignments of topics) and consequently provide various collaboration scaffolds (e.g. by means of recommendations). In addition, this infrastructure allows to map data from Askalot as well as from all datasets provided by Stack Exchange platform (Stack Overflow being one of them) into a common database schema in order to use them to validate the proposed methods.

Askalot in Practice

Askalot was employed at our university as a part of four CS classes. During a three-month-long interval, more than 600 users joined the community (see Table 1 for more detailed statistics). Involved teachers actively participated on common knowledge sharing with students. Students very early recognized the benefits of the organization-wide environment as students who enrolled for the same class in the previous academic year were able to help their younger classmates by harnessing their knowledge obtained in the past.

The interaction data collected during the experiment allows us to compare the question answering process in Askalot and in a standard open CQA system (see Table 2). We decided to employ a dataset from Stack Overflow as it also concerns with programming. From the comparison, we can see that successfulness of question answering in Askalot is quite similar as in Stack Overflow (the proportion of questions with at least one answer is even higher). Students in Askalot can be characterized as lurkers, since only a small proportion of them posted at least one question, answer or comment. On the other hand, we found out that significantly more

students tend to provide feedback (a positive/negative vote) on the content created by the rest of community.

In our future work, we plan to focus on providing students with an adaptive collaboration support by means of question routing, which refers to a recommendation of new questions to potential answerers.

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