Curating Educational Resources for Homework Management: A Support Prototype

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Abstract. Learning content curation plays an important role given the increasing amount of educational resources available on the Web. The process implies searching, collecting, annotating, filtering, organizing and sharing relevant resources for a specific learning context. Our aim is to provide a support platform which allows both teachers and students to become content curators, leveraging various levels of expertise. More specifically, we propose a system dedicated to homework management, called EdReHo, which allows the collection and sharing of educational resources needed to understand and solve assignments. When teachers create an assignment in EdReHo, they can recommend also a set of resources relevant for that topic, which are aimed to supplement the mandatory course material. The students can also add useful resources and share them with peers, becoming more actively involved in the process and benefitting from the "learning by searching" approach. The paper describes the EdReHo system prototype in terms of concept, features and implementation and illustrates its main functionalities.

Keywords: Learning content curation · Educational resources · Assignment management · Learning by searching · Student engagement

1 Introduction

Learning content curation refers to the identification, organization and contextualization of the most relevant information for a target group of students. The process implies the search and collection of educational resources from multiple sources, filtering the most suitable information for learners' needs and structuring it to facilitate comprehension. The value of the content can be further enhanced by adding a suggestive title, an explanatory description or relevant tags. Subsequently, the content can be shared with students and stored for future reference [3, 8].

Given the abundance of educational resources available on the Web, the role of content curator becomes essential for the teacher. At the same time, students can also be involved in the process. On one hand, they should be able to provide feedback on the content, by rating or commenting on it; thus they get more actively engaged with their learning and offer insights to the instructor [3]. On the other hand, students can become content curators themselves, searching for relevant resources and sharing them with peers. The process of searching and filtering information can foster learning [4]; in

addition, by annotating resources with meaningful terms, students create a personalized classification, facilitating subsequent retrieval [9].

In this context, we aim to provide a support platform for the learning content curation process. In particular, homework assignments are learning activities which generally require additional educational resources for the students. Hence, we propose a platform specifically tailored to homework management: on one hand it aims to help teachers curate learning resources and link them to homework assignments; thus, relevant resources are provided to the students just when they are searching for the information [3]. On the other hand, the system provides a learning space for the students, where they can act as content curators and share resources with peers. In addition, the platform is designed to support communication and feedback between students and teachers with respect to the homework activities. A prototype of the system, called EdReHo (**Ed**ucational **Re**sources for **Ho**mework), has already been developed, as detailed further on.

The rest of the paper is structured as follows: Sect. 2 presents an overview of related work, Sect. 3 describes the EdReHo prototype in terms of concept, functionalities and implementation, and Sect. 4 includes some conclusions and future research directions.

2   Related Work

In what follows, we discuss some relevant systems proposed in the literature, focusing especially on retrieving, collecting, searching, organizing, tagging, rating and sharing learning resources.

Paper [2] presents a platform for language learning in which educational resources consist in links retrieved from social bookmarking sites; the search is done automatically by the system, based on keywords attached by the teacher to each learning activity. When accessing such a learning activity, the student is presented with a list of 10–15 links, which they have the option to like or dislike; links are subsequently filtered based on the number of votes received from the learners.

Another system that provides the option of searching resources through various Web 2.0 services (such as YouTube, SlideShare, Blogger, Delicious etc.) is described in [7]. LearnWeb2.0, as it is called, allows the students to retrieve and store resources of interest, organize them in folders, bookmark, tag, rate, comment and share them with peers. Students can form groups around various topics of interest, in which they collect resources on a particular subject.

Automatic searching is also proposed in [1], by means of a federated search engine which helps students retrieve resources from various services (MIT OCW or OpenER courseware, Blogger, Technorati, YouTube, Slideshare etc.). Learners can organize resources into collections, tag, rate and share them with peers. A filtering option is provided, based on the popularity of the resources (in terms of the number of comments, links, saves, likes, ratings, votes, views, shares, trackbacks etc.).

A similar approach is presented in [9]; Edu3R system allows students to search through various learning object repositories (Ariadne, comPADRE, Connexions, LOR-NET, Merlot, OCW, OER etc.) and save resources of interest. These can be subsequently tagged, rated and shared with peers. A collaborative filtering mechanism is also included, which recommends learning resources based on student similarity.

A somewhat different approach, based on social tagging, is proposed in [5]. ASK-LOST 2.0 platform offers students the possibility to submit and tag learning objects and organize them in personal collections; they can also search, rate and comment on educational resources and access them via tag clouds. Moreover, students can also follow their peers and receive updates regarding the educational resources and tags created by them.

In addition to the dedicated systems presented above, some general-purpose existing services have been used for learning content curation, such as MediaWiki [10] or social bookmarking systems (Diigo, Delicious, Bibsonomy) [6].

In most of the above platforms, the selection of learning resources is done either by the students [1, 5, 7, 9] or by the teacher [2]. What we propose in our EdReHo system is to allow both teachers and students to become learning content curators, thus combining various levels of expertise. Furthermore, our platform is centered on homework management, so resources are aggregated and organized based on a very specific topic of interest; students are more engaged in searching for resources, as this helps them to solve their course assignments. Moreover, by allowing manual addition of the links, the system emphasizes the active role of the students, based on the "learning by searching" approach [11]; this also means that the source is not confined to a predefined set of learning object repositories and/or Web 2.0 services. More details regarding the EdReHo platform are included in the next section.

3 EdReHo Prototype

3.1 Concept, Features and Implementation

EdReHo is a web application designed to provide learning content curation support for both teachers and students. The aim is to allow the collection and sharing of educational resources needed to understand and solve homework assignments. When a teacher proposes an assignment, he/she should be able to recommend also a set of resources relevant for that topic. These resources are aimed to supplement the mandatory course material and could take various forms, both formal and informal, such as: additional lecture slides, developer guides, tutorials, video demonstrations, blog posts, source code examples on GitHub, StackOverflow answers etc. In addition, students could also search for useful resources on the web and share them with peers in case of group assignments. Peers' recommendations have the potential to be very relevant, as they reflect the preference of fellow students in a relatively homogenous learning community (e.g., a class centered around the same course, in which students have similar learning backgrounds) [9].

In addition, the teacher can always access the resources added by the students to an assignment and provide feedback if needed; in case of a useful and relevant resource, the instructor can choose to save it to his/her own collection of resources and link it to that particular assignment in the future. Conversely, in case of an incorrect or irrelevant resource, the teacher can use the built-in comment feature to signal this issue to the students. The possibility to add comments to assignments also encourages student communication and interaction with peers and with the instructor.

Furthermore, EdReHo allows both students and teachers to tag and rate resources. Tagging facilitates labeling and categorization of resources; subsequent retrieval is also

made easier by adding meaningful keywords. Tags also provide a personalized classification, which is relevant to the learning community [5]. In addition, the quality of the resources can be assessed both by students and instructors, by means of a simple 1 to 5 rating scale.

Some more details and illustrations of EdReHo functionalities are included in the following subsection. As far as the implementation is concerned, EdReHo was developed using mainly JavaScript as programming language. The following technologies were used on the client side: *Vue.js* (an open source JavaScript framework for building the user interface), *Pug.js* (a template engine used to inject data to produce HTML content) and *Stylus* (a dynamic stylesheet preprocessor language providing an efficient and expressive way to generate CSS). The server side is based on *Node.js* (an asynchronous event driven JavaScript runtime environment designed to build scalable web applications) and *Express.js* (the de facto standard server framework for *Node.js*), together with *MongoDB* (a document-oriented database for storing all persistent data).

3.2   Illustrating EdReHo Functionalities

When accessing EdReHo system, the instructor can choose between two main tasks: managing resources or managing homework, as illustrated in Fig. 1.
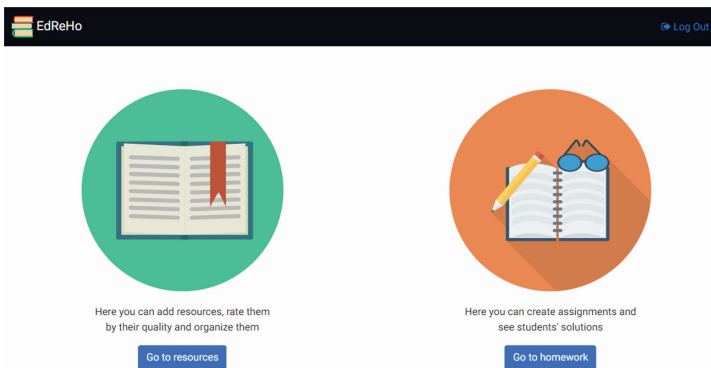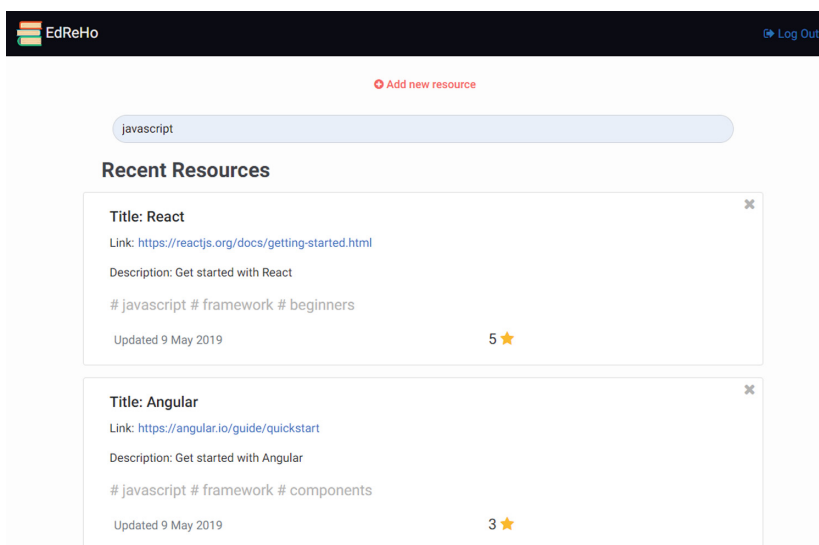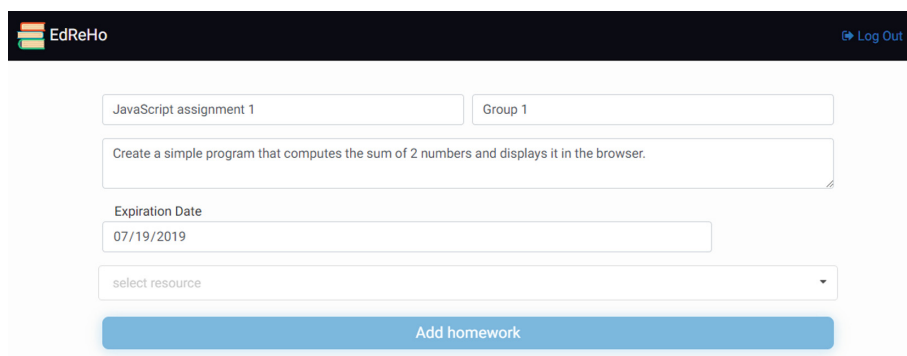

Fig. 1. EdReHo - Teacher welcome page

The resource management module offers support for learning content curation and enriching the learning resources database. Thus, the instructor can save a resource of interest by providing the link (URL) together with a title, a description, a set of tags and a rating. Subsequently, the teacher can visualize the list of resources and search /filter them (as displayed in Fig. 2).

The homework management module allows the instructor to create homework assignments and link recommended resources to them, as shown in Fig. 3. The teacher can also visualize the list of assignments, including the resources and comments added by the students and communicate with the learners if needed. Finally, the instructor can also access students' solutions to the homework and evaluate them by providing a grade and a feedback.

Fig. 2. EdReHo Teacher functionalities - Search for resources

Fig. 3. EdReHo Teacher functionalities - Create homework and add resources

The student can also act as learning content curator in EdReHo. The system provides the same functionalities with respect to resource management (adding, visualizing and searching educational resources). As far as homework is concerned, the student can visualize the list of assignments and select the one she/he prefers to solve. Subsequently, the learner can add some relevant resources for the assignment (in addition to the ones recommended by the teacher) and share them with peers; comments can also be posted to an assignment, ensuring communication with the teacher and fellow students (as illustrated in Fig. 4).

Finally, the student can also submit a solution for an assignment (and upload a corresponding file); once the solution is assessed by the teacher, the learner can visualize

Fig. 4. EdReHo Student functionalities - Add resources and comments

the feedback and grade. In addition, the system also sends email notifications to the learners when their solutions are evaluated by the instructor.

4   Conclusion

We designed and implemented EdReHo, a support prototype for curating educational resources, tailored to homework management. The system allows both teachers and students to become content curators, collecting and sharing educational resources relevant for a homework assignment. The process of searching, filtering, rating and tagging resources has the potential to increase students' engagement and critical thinking.

The next step is to experimentally evaluate the platform in various course settings. In addition, we plan to extend EdReHo with a recommender module, which can suggest resources of interest based on student's profile. A guided tagging approach could also be included, by automatically proposing keywords based on the resource content.

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