Introduction

Communities of practice have become increasingly influential within several fields since they are identified as an important mechanism through which individual and group knowledge is created and transferred [1]. The concept of communities of practice has been proposed by Lave and Wenger [2], who define a Community of Practice (CoP) as: “a group of people who share an interest, a craft, and/or a profession. It can evolve naturally because of the member's common interest in a particular domain or area, or it can be created specifically with the objective of gaining knowledge related to their area of interest”. CoPs that are facilitated by web-technologies are referred to as web-facilitated communities of practice or virtual communities of practice [3, 4].

The concept of CoP has also become very popular in the field of education and learning. As a result, educational communities of practice are being developed focusing on generating, sharing and reusing different types of educational knowledge [5]. The different types of educational knowledge, which can be generated and shared within educational communities of practice, can be divided into two types [6]:

- **Knowledge for educational practice**: this is formal knowledge depicted in the teaching practices that are constructed by teachers and/or instructional designers in an educational community and they can be used to improve the quality of teachers’ day-to-day educational practice. This type of knowledge can be considered as explicit, since it can be articulated codified and stored in certain media [7, 8].
- **Knowledge of educational practice**: this type of knowledge is constructed: (a) by teachers based on their experiences about their students’ learning and evidence of their progress in relation to given teaching practices, (b) by students based on their experiences about the delivery of given teaching practices provided by their teachers, and (c) by teachers-students interactions with these teaching practices. This type of knowledge can be considered as tacit, since it needs special effort to be codified and transferred [8].

In order to support the management of the aforementioned knowledge types within web-facilitated educational communities, in this paper we propose an approach for designing educational communities’ portals by identifying a set of generic knowledge management tasks performed within web-facilitated educational communities and we apply this approach to the design of a model teachers’ community portal.

Generic Knowledge Management Tasks

Tang et al. [9] have identified eight (8) Generic Tasks that can support typical knowledge management processes within web-facilitated communities of practice. For the purpose of our work, we have adapted these tasks accordingly, so as to be applicable to web-facilitated educational communities of practice and they are presented below:

- **Task A – Construct Knowledge**: During this task the members of the community (either as individuals or as members of a group) create new teaching practices (that is explicit knowledge for educational practice) and/or they provide their experiences in using available teaching practices (that is tacit knowledge of educational practice) using the available infrastructure. Both educational knowledge types can then be shared within the community (Task C – Share Knowledge).
- **Task B – Synthesize Knowledge**: During this task the members of the community (either as individuals or as members of a group) use the existing educational knowledge in its explicit form (namely, teaching practices) and/or its tacit form (namely, experiences in using available teaching practices via forum discussions, blog posts, personal messages, social tagging and wikis), in order to support Task A – Construct Knowledge.
- **Task C – Share Knowledge**: This task is twofold. The members of the community (either as individuals or as members of a group) (i) share the explicit educational knowledge (teaching practices) that was constructed during Task A and/or (ii) share their tacit educational knowledge through Web 2.0 tools (namely, blogs, wikis, social networks and social tagging).

- **Task D – Learn**: During this task the members of the community (either as individuals or as members of a group) use the knowledge presented in the community by either searching/retrieving it (Task H – Search/Retrieve Knowledge) or by using Web 2.0 tools (Task B – Synthesize Knowledge), so as to enhance their learning.

- **Task E – Evaluate Knowledge**: During this task the members of the community (either as individuals or as members of a group), perform some type of formal or informal (through simple reflections) evaluations on the educational knowledge which is presented in the web-facilitated educational community. The members may rate and comment on the teaching practices presented in the community by using Web 2.0 tools (Task B – Synthesize Knowledge).

- **Task F – Distill Knowledge**: During this task the members of the community (either as individuals or as members of a group) assess the design of explicit educational knowledge (depicted in teaching practices), in order to identify patterns that may lead to the extraction of general designs for later use and/or reuse.

- **Task G – Apply Knowledge**: During this task the members of the community (either as individuals or as members of a group) use the educational knowledge which is available in the community by applying it in their own educational practices. This can lead to the creation of new explicit and/or tacit educational knowledge (Task A – Construct Knowledge).

- **Task H – Search/Retrieve Knowledge**: During this task the members of the community (either as individuals or as members of a group) search and retrieve the existing educational knowledge that is available within the community, in order to support all the above mentioned tasks.

### An Approach for Designing an Educational Community Portal

Porter [10] has proposed the AOF method for designing web portals. AOF method stands for Activities, Objects and Features and it includes three (3) general steps. For the purpose of our work, we have adapted these steps, so as to be applicable to web-facilitated educational communities of practice.

- **Step 1 – Focus on the primary Activity**: This step includes the identification of the primary activity that the users perform in a web portal. For the case of web-facilitated educational communities the primary activity is the organization and sharing of the different types of educational knowledge (namely, explicit knowledge for educational practice and tacit knowledge of educational practice).

- **Step 2 – Identify the social objects**: This step includes the identification of the objects that users interact with while performing the primary activity defined in step 1. For the case of web-facilitated educational communities, the social objects are identified to the teaching practices that are available to the educational community members.

- **Step 3 – Choose the core feature set**: The final step includes the identification of the core feature set that will facilitate the users of the web portal to perform actions on the social objects defined in step 2. For the case of web-facilitated educational communities, the core feature set should be identified in response to the generic knowledge management tasks (presented in previous section) that the members of the educational community perform.

### Applying the Proposed Approach to the PATHWAY Teachers’ Community Web Portal

The PATHWAY Project ([http://www.bayceer.uni-bayreuth.de/pathway/](http://www.bayceer.uni-bayreuth.de/pathway/)) aims to support the adoption of inquiry based science teaching by demonstrating and disseminating best teaching practices. In this way the project targets to facilitate the development of communities of practitioners of inquiry that will enable teachers to share inquiry based teaching practices and learn from each other. For this purpose, in this paper we present how issues already discussed in this paper can be implements for the design of the PATHWAY Teachers’ Community Web Portal.
Posters

The first step of the approach includes the identification of the primary activity that the teachers perform in the PATHWAY Teachers’ Community Portal. This activity is the organization and sharing of explicit educational knowledge (depicted in inquiry based teaching practices) and tacit educational knowledge (depicted in teachers’ experiences of using inquiry based teaching practices). The primary activity is achieved through the eight (8) generic knowledge management tasks, which have been identified in previous section.

The second step of the approach includes the identification of the social objects that the teachers of the PATHWAY Teachers’ Community Portal interact with while performing the primary activity defined in Step 1. These social objects are the inquiry based teaching practices and scenarios.

The final step of the approach includes the identification of the core feature set of the PATHWAY Teachers’ Community Portal. In order to achieve that, we identify a set of actions that can be performed by the teachers with the social objects (namely, the inquiry based teaching practices) of the PATHWAY Teachers’ Community Web Portal in response to the set of generic tasks that constitute the primary activity of the PATHWAY Teachers’ Community Web Portal. Table 1 presents the mapping between the generic tasks and the actions that the teachers of the PATHWAY Project should execute in response to the realization of these tasks.

Table 1  Generic Knowledge Management Tasks Mapped to Teachers’ Actions from PATHWAY Teachers’ Community Web Portal

<table>
<thead>
<tr>
<th>Generic Knowledge Management Tasks</th>
<th>Store</th>
<th>Search</th>
<th>Browse</th>
<th>View</th>
<th>Download</th>
<th>Rate/Comment</th>
<th>Bookmark</th>
<th>Automatic Recommendations</th>
<th>Annotate with Metadata</th>
<th>Social Tagging</th>
<th>Discuss/Collaborate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Task A – Construct Knowledge</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Task B – Synthesize Knowledge</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Task C – Share Knowledge</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Task D – Learn</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Task E – Evaluate Knowledge</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Task F – Distill Knowledge</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Task G – Apply Knowledge</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Task H – Search/Retrieve Knowledge</td>
<td>–</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

As we can notice from Table 1, all generic knowledge management tasks can be realized from at least one of the proposed teachers’ actions. This means that the proposed teachers’ actions have been well selected. Finally, we map the identified teachers’ actions of Table 1 to specific features/modules that can be used for building the PATHWAY Teachers’ Community Portal. Table 2 presents the mapping between teachers’ actions and the features that are needed to support these actions.

As we can notice from Table 2, there are twelve (12) features/modules that need to be used for building the PATHWAY Teachers’ Community Portal towards enabling teachers of the PATHWAY Project to organize and share explicit and tacit educational knowledge.
In this paper, it was argued that it is important to design educational communities' web portals based on the tasks that are performed by educational communities' members for organizing and sharing explicit educational knowledge (depicted in teaching practices) and tacit educational knowledge (depicted in teachers' experiences of using teaching practices). For this purpose, we propose an approach for designing educational communities' web portals for supporting the management of the different types of educational communities' knowledge and we propose to apply this approach in the context of the PATHWAY Project for designing the PATHWAY Teachers' Community Web Portal. The results of this study can be used also for evaluating whether the features of existing educational communities' web portals are addressing the tasks that need to be performed by educational community members for organizing ad sharing the different types of educational knowledge.

Acknowledgement

The work presented in this paper has been partly supported by the PATHWAY Project that is funded by the European Commission’s 7th Framework Programme, Supporting and coordinating actions on innovative methods in science education: teacher training on inquiry based teaching methods on a large scale in Europe (Contract: 266624).

References

