Using Social Media for Collaborative Learning in Higher Education: A Case Study

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***Abstract*—This paper investigates the acceptability of using social media for collaborative learning in the context of higher education. A social media platform, Graasp, is used to support students' learning activities in a project-based course. An evaluation of Graasp regarding its usefulness as a collaboration platform, a knowledge management site, and a gadget container, was conducted with the course participants. Quantitative and qualitative assessment methods used in the evaluation, as well as the main findings are presented.**

Keywords-social media; collaborative learning; knowledge management; E-Learning 2.0

I. INTRODUCTION

With the rise of social media, Web users have become co-producers of social content rather than passive information consumers. Next to its wide usage for social interactions among young people, social media is also increasingly used to support learning activities. Many efforts have been made to incorporate social media into students' overall learning ecology, which leads to the emergence of E-Learning 2.0. The concept of "E-Learning 2.0" [1] refers to the adoption of social media in learning or education where learners are empowered to create and organize their own learning activities.

In practice, higher education institutions are still primarily relying on traditional learning management systems (LMS) that do not fully capitalize on the potential of social media for enabling participation in global learning networks, collaboration and social networking [2] [3]. According to a previous study by Clark et al. [4], while Web 2.0 participatory technologies have become an essential part of young learners' daily lives, very few learners are taking full advantage of these technologies to support their learning processes. Similarly, Greenhow & Robelia also argued in their study [5] that students do not perceive a connection between their online activities and institutional learning. Overall, the studies suggest that the potential benefits of using social media to create learner-centered education systems need to be further exploited and well understood by learners.

In this paper, we investigate the added value of using social media for collaborative learning in the context of higher education. A social media platform, namely *Graasp* (formerly *Graaasp* http://graasp.epfl.ch), is introduced to a number of undergraduate students, and then used in one of their courses to support project-based collaborative learning. The acceptability and expectation of such social media supported learning solutions is examined through a user study. The rest of the paper is organized as follows. Section II discusses the existing attempts of integrating social media into students' learning experience. Section III presents the structure and features of *Graasp*. The context of the user study is described in Section IV. *Graasp*'s acceptability in sustaining collaborative learning is evaluated and analyzed in Section V. Finally Section VI concludes the paper.

II. RELATED WORK

Compared to traditional learning management systems that provide few opportunities for learners to develop and maintain their own learning activities, learning platforms based on social media paradigms place the control of learning into the hands of learners themselves [6]. A growing number of research efforts have been made to support teaching and learning using a variety of social media tools. For example, Silius et al. [7] developed a social networking site for college students, aiming at enhancing both collaborative study and social interaction. Their research reveals that making social media tools a part of traditional learning is attractive to students and can motivate their participation in the learning process. In other similar studies, a social bookmarking tool [8], a blogging platform [9], or wiki software [10] have been used to engage students in collaborative projects and encourages creating, editing, and sharing content. The research suggests that, it is promising to adopt social media in the context of learning as it promotes collective knowledge generation and encourages active user participation. However, the application of social media to enhance learning solutions is still in its early phase and needs to be further explored. In our previous work [6], we have presented the social media platform *Graasp*, and investigated its potential role for sustaining collaborative learning activities through scenarios. In this paper, a real-world experiment has been conducted to evaluate the added value of using *Graasp* for students' collaborative work in a project-based course.

III. A SOCIAL MEDIA PLATFORM: *GRAASP*

Graasp is a Web 2.0 application developed at Swiss Federal Institute of Technology in Lausanne (EPFL in French). It can serve simultaneously as an aggregation, contextualization, discussion, and networking platform, a shared asset repository, or an activity management system. The structure of *Graasp* relies on the extension of the 3A

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interaction model [11], which is intended for designing and describing social and collaborative learning environments. The 3A model consists of three main constructs or entities: **Actors** represent entities capable of initiating an event in a collaborative environment, such as regular users or virtual agents. Actors create personal or collaboration spaces where they conduct personal and group **Activities** to reach specific objectives. In each of these activities, actors can take different roles with different set of rights. In addition, actors produce, edit, share and annotate **Assets** in order to meet activity objectives. Assets can consist of simple text files, RSS feeds, videos or audio files. The 3A model is extended to incorporate a fourth entity, namely **Applications**, to account for widgets or gadgets [12] that can be added and executed within activity spaces. **SALT** is an acronym adopted to describe the social media actions of Sharing, Assessing (i.e. rating and commenting), Linking, and Tagging that can be performed by actors on assets and applications in the context of activity spaces. These actions are believed to encourage contribution, collaboration, and reflection [11]. In *Graasp*, Actors, Activities, Assets, and Applications are mapped to People, Activity Spaces, Resources, and Apps respectively. *Graasp*'s main features that facilitate collaborative learning are discussed hereafter.

A. Collaboration within Spaces

The design of *Graasp* follows a bottom-up flexible approach that releases hierarchical and constraining default structures when it comes to managing joint projects. Instead of having a top-level administrator in control of all project spaces, everything is managed at the space level. Both tutors and students are entitled to create activity spaces. Spaces owners are free to choose between hierarchical or completely flat structures. In a flat-structured space, every member shares equal rights so that no one acts as a supervisor who superintends the learning process. As an example, a team of students is able to create a project space where all members share, discuss, organize learning resources (using tags or sub-spaces), and collaboratively coordinate the project's activities. Additionally, *Graasp* also enables top-down hierarchical structured spaces where members can take different roles. For instance, tutors can create a course space to define the course milestones, post learning materials, and organize the learning activities. In order to keep users aware of the ongoing activities, *Graasp* enables them to subscribe to RSS feeds within a space to trace changes.

B. Collective Knowledge Generation and Management

Unlike traditional learning management systems where learners are only allowed to access the curriculum given by the tutor, *Graasp* empowers students to create, aggregate, share, and organize the learning resources by themselves. *Graasp* offers typical social media features such as tags, ratings, comments, wikis, and bookmarks. Tags enable users to classify their collections in the ways they find useful, and also facilitate building a folksonomy in the learning community [13]. Such bottom-up classification is particularly helpful for efficient search and recommendation since user-defined tags make it easier to discover relevant items. With respect to ratings and comments, they provide an easy way for users to express their preferences and thus help evaluating the quality of user-generated content from the community perspective. As far as wiki is concerned, it enables users to co-create social content and cooperatively work towards common goals. It is worth mentioning that *Graasp* provides a bookmarking feature, "*GraaspIt!*", with which users are able to grab and link external Web pages into their *Graasp* spaces. This feature facilitates knowledge aggregation from a variety of public sources.

C. Learning-Oriented Gadgets

Not only does *Graasp* serve as a knowledge management and collaboration platform, but also as a gadget container. Gadgets can run and communicate within *Graasp*. This capability reinforces the learning experience because it enables useful learning-oriented tools to be added and launched during the learning process. Different collections of gadgets can be associated to different spaces, making the aggregation contextual. Thanks to this feature, *Graasp*'s provided functionalities are made flexible and extendable. For instance, in a project space, students can add a calendar gadget configured with a series of milestones and deadlines. Other gadgets such as notepad, to-do list, and learning plan application could be useful as well.

D. Privacy Control Scheme

Since *Graasp* provides a relatively open learning environment, there is a clear need for effective privacy control mechanisms that protect against unauthorized access to social data. Instead of adopting complicated privacy management schemes that are difficult for users to cope with, the privacy settings are maintained at the space level. Based on its purpose and its owner's choice, a space can be public, closed, or hidden. Public spaces are globally visible and allow every user to join. Closed and hidden ones are only accessible upon explicit invitations. Hidden spaces are not searchable and they are only visible to space members. Closed and hidden spaces are especially useful when students want to carry out their peer-based projects without being disturbed by others or feeling that they are "observed" by the tutor.

Within a specific space, users are allowed to take different roles: owner, editor, and viewer. Each role is associated with a set of rights allowing users to perform diverse actions such as moderating the space, adding new assets in the space, commenting, rating, tagging, bookmarking, and so on. Only space owners are entitled to assign roles to other space members. Assigning different roles in a collaborative space makes users aware of their duties and gives them the opportunity to concretely collaborate by being allowed to perform specific actions. Finally, the access permissions of assets and gadgets inherit from the space they belong to.

IV. USING *GRAASP* FOR COLLABORATIVE LEARNING

To examine the acceptability and user satisfaction of *Graasp* in terms of supporting collaborative learning, it was used as a collaborative work platform in a project-based

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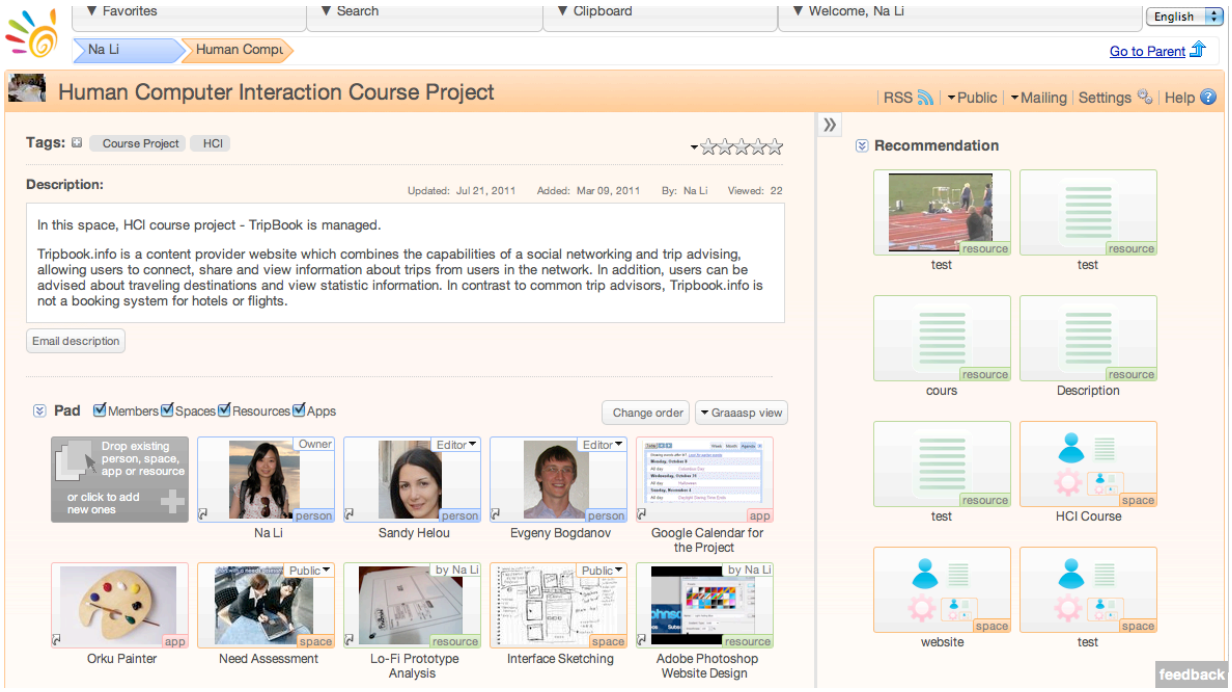

Figure 1. A project space in *Graasp*

course of *Human Computer Interaction* offered at Tongji University in China. 28 undergraduate students were involved in the course and they were divided into 8 teams. Each team was required to accomplish a group project. *Graasp* was introduced to the students at the beginning of the course. Since it is an intensive course, the students' teamwork was limited to two 4-hours face-to-face sessions and a 30 minutes' final presentation spread over a three-week period. As a result, the total usage of *Graasp* was not expected to be very high.

After a brief introduction of *Graasp*, students were shown how they could create their project spaces, share resources with each other, play different roles in the project, and work with different gadgets. An example of a project space is illustrated in Fig. 1. The "*Human Computer Interaction Course Project*" space is shown on the left side of the user interface, and the recommended items are shown on the right side. The space members, sub-spaces, posted assets (resource), and added gadgets (app) are displayed in the "*Pad*" of the space.

During the course, each group of students was entitled to create their project space (as shown in Fig. 1), and invite all the team members to join. They then chose a privacy type for their space, and assigned different permissions to the team members depending on their different roles. Within the space, students could co-edit the wiki and make discussions through comments. Course resources were added into the space either through direct creation within *Graasp* or by grabbing external data using "*GraaspIt!*". Space members could also create sub-spaces in order to organize and structure their collaborative work if necessary. A few gadgets (e.g., mockup gadget and project management gadget) that were believed to promote the learning process were provided to the students to work with. Students could also "grasp" more gadgets from online gadget repositories such as iGoogle (http://www.google.com/ig/directory?type=gadgets).

V. EVALUATION AND ANALYSIS

To investigate the acceptability of *Graasp* as a collaborative learning platform, a user study was conducted with the students participating in the course described in Section IV. The evaluation methodology and main findings are addressed in this section.

A. Evaluation Methodology

The evaluation consists of two parts: a quantitative assessment relying on students' action log throughout the period of the course, and a qualitative assessment through a user questionnaire distributed after the course.

In the first part of the evaluation, students' activities within *Graasp* are analyzed in the following aspects: the number of entities (people profiles, activity spaces, assets, and apps or gadgets) created, the number of invitations sent to join a space, the number of tags, comments, ratings, and wiki generated, and the use of privacy control feature. The objective is to examine the general usage of *Graasp* and students' online interactions during the course.

In the second part of the evaluation, an online questionnaire was distributed to the course participants after the final presentation of their teamwork. The user questionnaire is composed of Likert-scale questions [14]

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with 5-point preference scale (strongly disagree, disagree, neutral, agree, and strongly agree), multiple choice questions and open questions. The questions can be grouped into the following categories: the general usefulness of *Graasp*, the usefulness of *Graasp* as a collaboration platform, the usefulness of *Graasp* as a knowledge management system, the usefulness of learning-oriented gadgets, and the user satisfaction regarding the privacy control scheme. The user questionnaire is summarized in Table I. In addition, we also used the Desirability Toolkit approach [15], where the study participants were asked to select 5 adjectives that can best describe their personal experience with *Graasp*, from a list of 118 words. Through this approach, we got a depth of understanding and authenticity in participants' experience and opinions on *Graasp*.

TABLE I. USER QUESTIONNAIRE

I	**General usefulness**
	Generally speaking, I find *Graasp* useful for my teamwork.
	I think *Graasp* is useful for the following reasons (Easy sharing, Project management, Resource organization, Resource aggregation, and Gadgets integration)
	Using *Graasp* improves my motivation for carrying out my teamwork.
	I predict that I would frequently use *Graasp* in the future.
II	**Usefulness as a collaboration platform**
	I feel comfortable to do teamwork with my classmates in a project space.
	I find it useful to add an item in a space and share it with space members.
	Have you organized your people connections using spaces? Why?
III	**Usefulness as a knowledge management system**
	I like to use spaces to organize my resources.
	I think it is useful to aggregate different resources into *Graasp* using "*GraaspIt!*".
	Have you used the wiki? Why?
	Have you used tags? Why?
IV	**Usefulness of learning-oriented gadgets**
	I think the following gadgets are helpful for my learning or working activities (Project management gadget, Mockup gadget, and Other gadgets I found).
	I think it is a good idea to integrate gadgets into my learning or working process.
	What other gadgets will be useful for your collaborative learning and teamwork?
V	**User satisfaction of privacy control scheme**
	I am satisfied with having control over the privacy settings (public, closed, hidden) of my spaces and profile.
	I feel it is necessary to assign different permission (owner, editor, and viewer) to others over my resources.
	I would like to have an option to specify more detailed permissions, such as "who can tag on me", "who can comment on my space", and so on.

B. Study Participants

The user study was conducted with 28 undergraduate students, who were the intended audience of the *Graasp* system. All participants were frequent Web users who were familiar with social media platforms and Web 2.0 technologies like blogging, wiki, rating, tagging, and bookmarking. However, most of them did not have much experience of using online learning systems. Instead, the most common tools used for teamwork were instant messenger and email. A few students claimed to use shared calendars for collaborative projects.

C. Results and Discussion

The quantitative results extracted from students' action log and the qualitative feedback collected through user questionnaires are discussed in this section. The number of items created throughout the course period and the proportion of students using the corresponding feature are illustrated in Fig. 2 and Fig. 3 respectively.

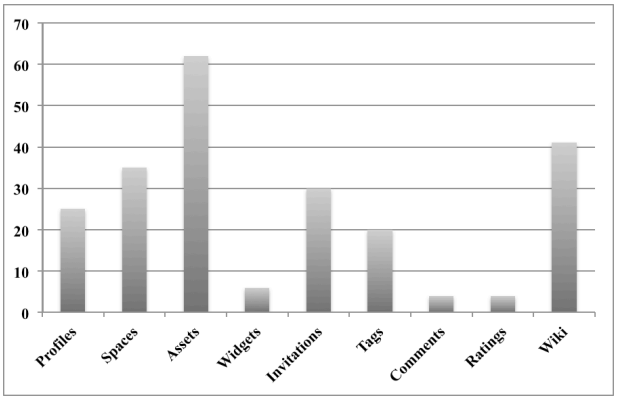

Figure 2. Numbers of items created during the course period

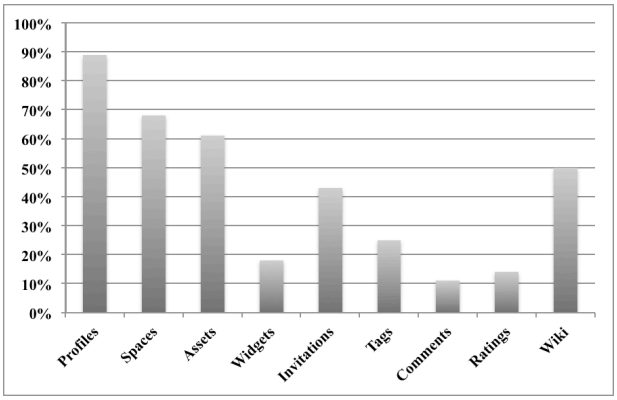

Figure 3. Proportion of students using the features

As shown in the figures, 25 out of 28 students registered with *Graasp*, 35 new spaces were created by 19 students (25 home spaces were also created by default when the users registered), 62 assets were posted by 17 students, and only 6 gadgets were added by 5 students in total. The results indicate that the overall usage of *Graasp* was not high, which matches our initial expectation since students were given only a few hours to carry out their teamwork. In contrast to the other entities, the reason why a small number of gadgets

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were created might be the lack of course relevant gadgets in the online gadgets repositories. Within 35 spaces, 30 invitations were sent, and 22 of them were accepted. This suggests that although the general usage of *Graasp* was not high, some active users utilized space as a place to collaborate with each other.

Regarding the use of typical Web 2.0 features, 20 tags, 41 wiki, 4 comments, and 4 ratings were generated (as shown in Fig. 2). Students later in the user questionnaire explained that they thought tags were helpful to search for relevant items, and also facilitate describing and classifying content. Students also pointed out that wiki played an important role in providing basic information of an item and defining the learning context. This is consistent with the fact that the use of tags and wiki was relatively active (as shown in Fig. 3). The reason behind the low usage of comments and ratings was explained to be the fact that there was not sufficient social data in the current system to evaluate.

As for the use of privacy control feature, among 60 spaces including 25 default home spaces, 19 of them were set to public, 17 ones were closed, and 24 ones were hidden. The diversity of privacy settings confirms the students' answers in the questionnaire that it is necessary to set different privacy levels to spaces depending on what a specific space is used for.

In addition to the quantitative assessment through the log of students' actions, user questionnaires were also collected and analyzed after the course. All the 28 user questionnaires were successfully completed. The results and findings are presented hereafter.

With respect to *Graasp*'s general usefulness, 64% participants considered *Graasp* useful as a platform for sharing and organizing resources, 46% of them perceived it as an adequate place to collaboratively manage their projects, and 46% of them recognized its usefulness as a system aggregating content from various sources. Slightly over a half of the students (52%) confirmed that *Graasp* improved their motivation for carrying out their teamwork. A reason why the result is not satisfying enough is due to the technical problem of slow network connection in the campus. Also, the students pointed out that they felt less motivated since there were not sufficient peer connections besides the rest of their classmates attending the course. Furthermore, the lack of social resources in the current system somehow disappointed them as well. To solve this problem, the capability of exchanging social resources and personal contacts with popular social media platforms could be a possible direction. The interoperability with such platforms needs to be further explored in *Graasp*.

The rest of the questionnaire was intended to investigate students' satisfaction of *Graasp*'s usefulness in different aspects. The qualitative results shown in Fig. 4 reveal that the majority of the students were satisfied with using *Graasp* for those purposes. More specifically, regarding the usefulness of *Graasp* as a collaboration platform, 57% of the students expressed their preference for carrying out teamwork within project spaces. 74% of them thought it useful to share items with others using spaces. 17 participants claimed that they organized their people connections by placing them into different spaces. Students pointed out that it was an effective way to classify personal contacts depending on different context. However, 11 students never used this feature. The reason given was that there were not yet many contacts to classify, and all their contacts were their classmates. In short, the role of *Graasp* in supporting collaborative work is quite satisfying. Most people thought it comfortable to undertake teamwork using *Graasp*.

From the perspective of supporting collective knowledge management, 59% of the participants considered it convenient to structure and organize resources using different spaces, and a slightly higher proportion of them (67%) affirmed the usefulness of aggregating resources using "*GraaspIt!*" feature. Moreover, 17 out of 28 students stated that tags helped them to describe and classify content easily, while the remaining said that there was no need to use tags due to the lack of data existing in the system.

When asked whether learning-oriented gadgets can enhance their learning experience or not, 63% of the students confirmed that the integration of gadgets into their learning process was helpful. It is worth mentioning that there is a huge difference between the percentage of users' preference (63%) and their real usage in practice (18%). This implies that although users are hoping to use gadgets for collaborative learning, it is difficult for them to find useful gadgets intended for learning activities in online repositories. Therefore, more efforts are needed to develop project-management and learning-oriented gadgets that could comply with learners' learning requirements. In the questionnaire, students also proposed a few potential gadgets that could help them achieve their learning goals, such as online chatting tool, learning plan application, to-do list with reminder, and so on.

As far as the privacy control feature is concerned, 74% of the students were satisfied with having control over the privacy levels of spaces and user profiles. Granting different permissions to others over their personal resources was perceived as an essential feature as well. In the current *Graasp* system, only three types of permissions are allowed: owner, editor, and viewer. It was suggested by the participants that more fine-grained permission rules should be added. Users should be capable of defining their own

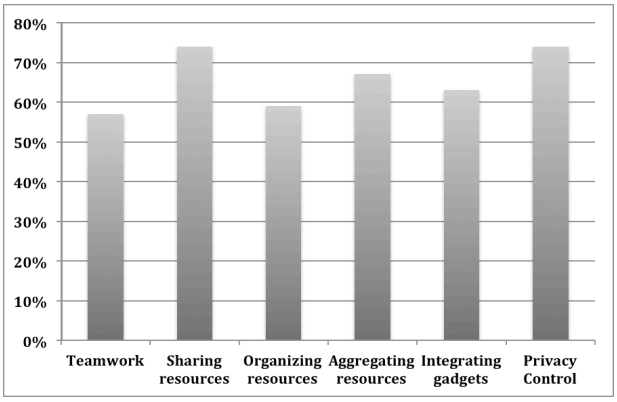

Figure 4. Students' satisfaction of *Graasp*'s usefulness

permission rules, such as "who can tag on me", "who can comment on my space", and "who can link my resources by drag and drop". This requires further evaluation, and raises the challenges of a trade-off between more fine-grained choice and an increased system complexity.

Finally, we asked the participants to pick 5 adjectives that closely matched their personal reactions to *Graasp* from a list of positive and negative words. A word cloud, showing the frequency of the selected adjectives, is presented in Fig. 5. Among a variety of words, the most frequently picked ones were accessible, personal, trustworthy, reliable, and slow. The overall assessment is quite encouraging with a few negative opinions like slowness. One should note that the performance problem is mainly due to the limited network bandwidth in the campus and the cross-country data transmission.

Figure 5. A word cloud based on frequency of selected adjectives

VI. CONCLUDING REMARKS

This paper discussed the usage of social media in learning contexts. A social media platform, namely *Graasp*, simultaneously offering as a bottom-up project management platform, a resource repository, a collaboration site, and a gadget container, is presented. The evaluation of its acceptability among students taking a HCI course is also discussed. Despite a technical problem of bandwidth that causes slow server response, results show that students were satisfied with using *Graasp* to enhance knowledge management and collaboration. Organizing content using subspaces or tags was less exploited due to the lack of data in the platform. Students mentioned that to be able to use *Graasp* outside the scope of the course, it would be useful to be able to import contacts from other popular sites. Future work will focus on interoperability efforts to ease the exchange of resources and contacts with other social media platforms based on standards such as OpenSocial, already used for inter-gadget communications.

Within the framework of another research project, *Graasp* is now being deployed and increasingly used by students from the Universities of Geneva and Fribourg. Large-scale evaluations involving courses that span over a longer period of time will be conducted to further examine the added value of using *Graasp* for collaborative learning.

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REFERENCES

[1] C. Safran, D. Helic, and C. Gütl, "E-Learning practices and Web 2.0," Proc. International Conference on Iteractive Computer Aided Learning, vol. 1, pp. 1-8, 2007.

[2] N. Dabbagh and A. Kitsantas, "Personal learning environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning," Internet and Higher Education (2011), in press.

[3] C. McLoughlin and M. Lee, "Personalised and self regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software," Australasian Journal of Educational Technology, vol. 26, pp. 28-43, 2010.

[4] W. Clark, K. Logan, R. Luckin, A. Mee, and M. Oliver, "Beyond Web 2.0: mapping the technology landscapes of young learners," Journal of Computer Assisted Learning, vol. 25, pp. 56-69, 2009.

[5] C. Greenhow and B. Robelia, "Informal learning and identity formation in online social networks," Learning, Media and Technology, vol. 34, pp. 119-140, 2009.

[6] N. Li, C. Ullrich, S. El Helou, and D. Gillet, "Using social software for teamwork and collaborative project management in higher education," Proc. International Conference on Web-based Learning, vol. 6483, pp. 161-170, 2010.

[7] K. Silius, T. Miilumäki, J. Huhtamäki, T. Tebest, J. Meriläinen, and S. Pohjolainen, "Students' motivations for social media enhanced studying and learning," Knowledge Management & E-Learning: An International Journal, vol. 2, pp. 51-67, 2010.

[8] T. M. Farwell and R. D. Waters, "Exploring the use of social bookmarking technology in education: an analysis of students' experiences using a course-specific Delicious.com account," Journal of Online Learning and Teaching, vol. 6, pp. 398-408, 2010.

[9] D. Rosen and C. Nelson, "Web 2.0: a new generation of learners and education," Computers in the Schools, vol. 25, pp. 211-225, 2008.

[10] S. Hazari, A. North, and D. Moreland, "Investigating pedagogical value of wiki technology," Journal of Information Systems Education, vol. 20, pp. 187-198, 2009.

[11] S. El Helou, N. Li, and D. Gillet, "The 3A interaction model: towards bridging the gap between formal and informal learning," Proc. International Conference on Advances in Computer-Human Interactions, pp. 179-184, 2010.

[12] Gadgets Specification, http://code.google.com/apis/gadgets/docs/spec.html, retrieved Sep. 2011.

[13] S. Sen, S. K. Lam, A. M. Rashid, D. Cosley, D. Frankowski, J. Osterhouse, F. M. Harper, and J. Riedl, "Tagging, communities, vocabulary, evolution," Proc. Anniversary Conference on Computer Supported Cooperative Work, pp. 181-190, 2006.

[14] R. Likert, "A technique for the measurement of attitudes," Archives of Psychology, vol. 140, 1932.

[15] J. Benedek and T. Miner, "Measuring desirability: new methods for evaluating desirability in a usability lab setting," Redmond, WA: Microsoft Corporation, 2002.

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