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Request 4 Learning - a Connectivism Inspired Social Media Learning Environment

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Abstract: The interaction concepts behind social media applications closely meet human social needs. Aggregated overviews allow staying informed about activities that took place in one's own social environment easily. Social media interactions (e.g. posting, sharing, commenting, voting and networking), activity feeds and the concept of involving each user as consumer and producer of valuable content, are promising elements to be used for educational purposes as well.

Traditional didactic concepts are questionable, when learners are nowadays used to actively surfing the web for hints, insights and solutions to problems, instead of passively accepting pre-structured and didactically well-prepared material. This new resource-based, self-directed learning already led to emergence of new learning theories like connectivism. Always pedagogues aimed for using activating didactic concepts and collaboration scripts to stimulate individual and collaborative creation of solutions and learning resources. In the field of computer supported collaborative learning, algorithms and software systems emerge that allow effective collaboration and knowledge sharing.

We aim for bringing together the both fields' potentials and use social media concepts for stimulation of collaborative learning and active resource creation. Therefore we created the prototype Request4Learning, which is a web-based social media community and learning platform. Its didactical concept is strongly inspired by the Quest to Learn concept used in a prototype school in New York, USA. The game-based concept behind provides pupils with missions, which they can take over and try to accomplish. Missions cover several subjects and are structured into smaller quests. In this concept, the teachers become mentors and learning is characterized by highly individualized activities.

Our proposed Request4Learning social media application provides a community platform where users see an overview about activities related to the currently active missions that are offered by the system. The quests of missions can be of different types. These types are didactically inspired and range from material collection to jigsaw sessions. Users can share web content or type solutions to quests, can see, vote up, vote down and comment others' solutions thereafter and earn badges in the end, if their solution got the most votes. Teachers can create missions, quests and badgets and manage the user accounts. In general, users gain points for each activity. Leaderboards present most active users and/or badge owners. Overall, such modern social media-based learning environments may be able to change the way learning and teaching takes place in a connectivism-inspired environment.

In the course of this paper we will present the core concepts used in Request4Learning, how social media interactions are used to stimulate connectivism-based learning and present the results of the conducted evaluation. Students of an international class used Request4Learning during a full-day seminar and were offered with two missions. Each mission consisted of several quests for resource collection. Thus they were strongly involved in searching the web for resources and answers and commenting, voting and discussion the results within Request4Learning (and within class). The evaluation results show strong acceptance of the system and give hints for future research.

Keywords: Quest to Learn, user-generated content collection, Request4Learning, CSCL, connectivism, learning quests

1 Introduction and motivation

Modern internet and collaborative applications allow new didactical concepts for learning. Beside new possibilities for visualization of learning progress and adaptation of the learning path (like done in tutorial systems), internet technology allows the inter-connection of learners for active exchange of ideas, concepts and approaches towards a (given or selected) learning topic. Traditional group-work concepts can be relaxed concerning restrictions in time and place. Learners can still be working together even if not online at the same time or being not at the same place. Inspired by concepts of flipped classroom (Sarawagi 2014), problem-based learning and the school concept Quest2Learn (Tekinba et al. 2010), we aim for a solution for computer supported collaborative learning based on given missions and questions to be solved. As such participants create and share their own solutions

(user-generated content) by using commonly known and accepted social media interactions (Julien 2011). To achieve this, they re-arrange content parts and resources found on the Internet. This active learning by searching for relevant resources, evaluating them for relevance and accuracy, bringing them into order and finally aggregating them to use the result as a proposed quest solution, is part of the learning activities named by Siemens (2005) for Connectivism. For students from the generation of digital natives and with a gaming intensive childhood it is assumed that the provision of several independent quests within Request4Learning's missions that can be taken over voluntarily, improves acceptance of the concept. Second, the solution leads not only to student activation, but also for responsibility for the contributions as these are commented, (dis)liked and finally accepted or discarded. Additionally, the overall concepts is as well strongly inspired by peer education concepts as these can be applied for improvement of learning outcome, engagement and knowledge sharing among students (Damon & Phelps 1989; Konert 2014, p.103ff).

In this paper we describe the system and interaction model of the Request4Learning system, the implemented prototype functionality and the evaluation that was conducted to find evidence for acceptance of social media interactions for quest-based knowledge exchange.

2 Related work

2.1 Theory of learning

The underlying theories about to learning from the field of pedagogical psychologies are mainly related to Jean Piaget, Lew Vygotsky and Albert Bandura. Even though Bandura has his foundation in behaviorism while Piaget and Vygotsky belong to the school of constructivism, we argue for not considering the theories as isolated, as the combination of all three theories' insights into the importance of social interactions for personal development (and thus learning) is evident.

Piaget argues that for construction of coherent mental models of the environment, social interaction and group-discussion play a major role as they stimulate the appearance of cognitive conflicts (disagreement) that have to be solved by discussion and argumentation (Doise et al. 1975, p.377). Vygotsky even proposes that the interaction with others is crucial for learning as it "creates the zone of proximal development" (Vygotsky 1997, p.35). Badura's theory builds on the importance of observations which have to be reflected. An observer reasons about the consequences an adoption might have and whether or not it is worth it. In this sense learning is a model-based approach. The model is refined by adaption of observed behaviors into the model with several conditions.

More recently, Siemens (2005) proposed connectivism as an evolved learning process, in which "Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing."(Siemens 2005). Consequently, connectivism does not any longer try to explain learning as an individual (inner) process of comprehension, but more as the process of conducting an optimized order of activities to interconnect pieces of information from (external) resources. Combining connectivism with social media interactions where user-generated content represents the resources to be connected, leads to the concept of clickolage (Pearce 2012). Pearce emphasizes the applicability of patching up social media content pieces inside and outside of the classroom.

2.2 Social media for learning and peer education

Social media interactions (Julien 2011) are used in various personal learning environments (PLE). Some focus on supporting the individual learner in optimizing the learning process (Li et al. 2011; Stepanyan et al. 2009), others focus on support for collaborative content creation (Denny et al. 2008). More recently connectivism-based massive open online courses (cMOOCs) emerged as a consequence in combining collaborative learning and social media (Martínez et al. 2014). As it is critically questionable which quality the created learning content has due to missing quality control, several approaches (as the named examples above) aim for using social media interactions primarily for peer assessment and peer feedback to introduce a loop of content improvement and to avoid manifestation of misconceptions, but also to unleash the potential of knowledge exchange among the peers (Damon & Phelps 1989).

2.3 Game-based learning and the concept of Quest to Learn

Basically, the motivation behind game-based learning is to bring the concept of flow to learning by using methods and technologies originating from the field of video games (Sweetser & Wyeth 2005). While flow leads to intrinsic motivation due to proper adaptation and personalization (Mehm et al. 2012), concepts for achievements and badgets can additionally be used to guide the selection of

users' activities (Jakobsson 2011; Konert et al. 2013). The key point in achievements for learning is their rewarding for desired behavior.

The concept of Quest to Learn (Q2L) has been developed by an expert group of game design, practitioners and pedagogues by combining such game-based learning concepts and achievements with the curriculum to be used as an overall concept for operation of a middle school[1]. With Q2L the subject matter to be taught are divided into discovery missions and further into individual quests. The learners should be able to work on these quests independently and responsibly.

A discovery mission targets different types of final results. For example, it may be a target of discovery missions to gather information, analyze, modify, develop theories or check the correctness of an experiment result. Discovery missions are problem-solving tasks, which lead students in a number of steps to the goal (Grünberger 2011).

Quests are tasks with target character, in which learners are able to acquire knowledge and skills gradually. By increasing demands of successive quests, and under making available the necessary additional materials, the goal of the discovery mission is to be achieved. With completion of several quests, usually four to ten of them, it is possible to finish a discovery mission (Tekinba et al. 2010).

3 Model for social media learning in Request 4 Learning

Based on these insights from related work we propose the *Request4Learning* (R4L) social media application with the aim to create one of the first web-based collaborative learning systems that incorporate connectivism and game-based learning components together using the Quest to Learn matter.

Didactically, R4L can be used either as a pure e-learning PLE or in blended learning scenarios. Social media interactions of creating, sharing, commenting, voting and networking are used as follows:

3.1 Being a member of Request 4 Learning

R4L offers a usual social community platform, where users create accounts, choose a nickname and fill their profile. R4L offers two-sided friendships, personal newsfeeds and walls where befriended users can leave comments.

On top of this, teachers (users with admin role) can create learning categories. These are technically tags which are later used to categorize missions. Additionally, teachers create badges, which are mission-dependent trophies awarded when the time of a mission is over. Badges have a pictorial representation, description and can be configured to have one to three level (1star to 3 stars similar to gold, silver, bronze medal). R4L will award the badge(s) associated with a mission automatically based on the number of points users achieved in solving quests of the mission.

Beside badges there are achievements. These are trophies, defined by a teacher to be manually assigned. Achievements are not meant to be bound to missions. They are given for (globally) creditable behavior and activity of users.

3.2 Engaging with missions and quests

Teachers can create missions and individualize them by description text (HTML-based) and pictures. They choose a picture to be used as slideshow-teaser on welcome page of R4L. Missions are categorized by using the tags that were created before (see Section 3.1) and specific badges are selected that are won by being among the best students fulfilling the mission's quests. A certain end-time (date, hour) is set when the mission is over and the results will be evaluated for badge assignment. Depending on the number of levels a badge has, the users are assigned a silver, gold and bronze-version of the badge depending on the points the users gathered up to this time. These trophies are made visible in their profile announced in the newsfeeds and there is a leaderboard "hall of fame" showing the trophies achieved within the last three months. Users can disable the displaying of their trophies in their privacy settings.

Innovative aspects are the gathering of points per activity and based on likes and dislikes of submitted solutions by other users. For commenting, uploading a new solution and for voting a user gets himself points. Thus, R4L stimulates active participation and assessment of others' solutions.

Conceptually, a mission is only a container associated with an end-time and certain badges. The interactivity comes with the quests added to a mission. A quest can be of different (didactical) types.

[1] Since 2009 Quest to Learn is put into practice in a school of Manhattan, New York

Material collection: Asks students to find material to answer a certain question of related to a certain topic. Users can copy and paste texts, images or video-links from the internet as answers. They primarily use social media interactions of sharing.

Jigsaw: The teacher provides several text, video or image-collections and guiding questions. The students are assigned only one of these collections to look at. Afterwards they type and upload a summary of their content. In the end they see and discuss with the others their summaries of (different) content-collections. The aim is to come to a consensus concerning the guiding questions given before.

Text development: While a traditional wiki allows collaborative writing of an article without any structural guidance, the text development is meant as a token-based activity. One user has the token and can edit the text (amend it) for a certain time. Then the token moves on and the next one can edit. By commenting and voting (likes/Dislikes) all other users participate in the evolvement of the text. When all users have written at least once, the token can freely be handed over among the participants. Here primarily the social interaction of publishing is promoted.

This list of quest types is only an excerpt. More quest types are conceptually and technically possible.

All quests offer parameters to teachers to influence the collaborative aspects and the autonomous work. Quests can be set to show already uploaded answers of others only after a user has given one answer by herself before. Additionally, quests can be given an activation date and time. Thus the quest can be read and be worked on, but solutions are not possible to submit for a certain time. Even individual and/or group submission can be activated to allow collaborative editing and submission of one solution.

3.3 Social Interaction: peer assessment and peer feedback

Beside qualitative assessment and feedback by peers based on comments (knowledge exchange) the peers are given several quantitative voting mechanisms. Which mechanism is offered for quest solutions can be set by the teacher upon creation. Up- and down-voting allows a thumbs-up or thumbs-down rating resulting in +10 points or -10 points for the user associated with a rated comment or solution. A 5-star-Likert scale allows to set a rating from -20 to +20 points. Finally, the third currently supported rating type is a field for grades. Depending on the country of usage, the grades vary (A-F, 1-6 or 0-100%).

Beside the peer interactions directly related to the quest answers (voting and commenting), users have their personal walls and feeds which allow to recognize where in the community currently are activity is concentrated (which quests are currently worked on).

Central to the game-based concept is the possibility to re-submit solutions, e.g. an updated version based on the comments and votes received. This encourages users to improve their answers in order to achieve more rating points which in the end lead to the awarding of badges.

4 System Architecture and Implementation

The system architecture is a standard MVC-pattern using a role-rights-model to distinguish users into anonymous, not activated, not logged in, unprivileged and privileged (both logged in). The social media content assets are primarily the missions, quests, delivered answers, as well as the qualitative and quantitative feedbacks and finally the badges and achievements as rewards for users' activities. Figure 1 illustrates how users interact with missions and quests and how their social media based activities like delivery of solutions, voting and commenting contribute to the rewards.

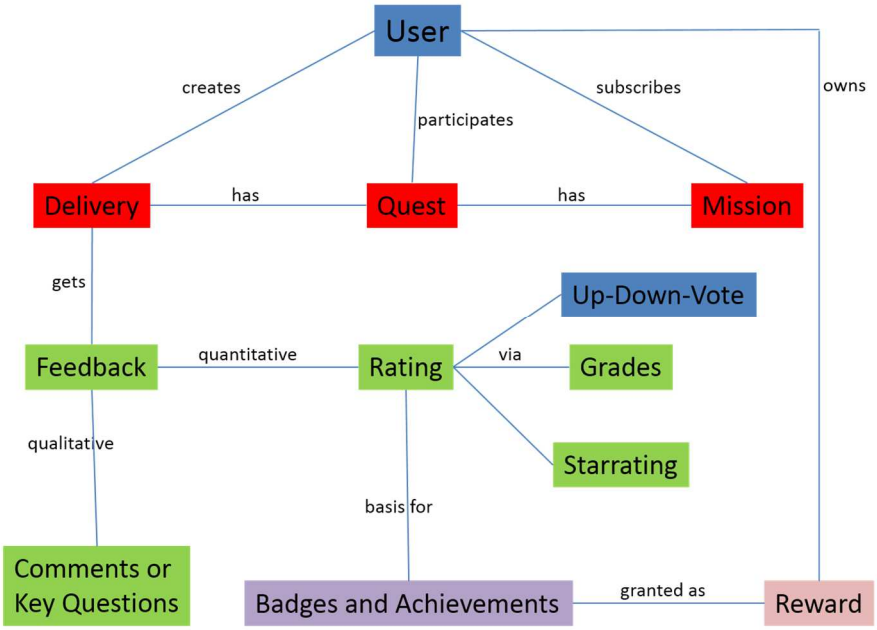

Figure 1: Interdependencies of user, activities and rewards.
(Same color means same technical component in implementation)

For implementation the PHP-based Woltlab Community Framework[2] (WCF) was used, which is licensed under the GNU Lesser General Public License (LGPL). The framework provides a MySQL database connection as well as a template language system and other basic features for online communities. Figure 2 shows a screenshot of the main landing page after login. The user is shown his current mission(s) and the status (here one of two containing quests have been worked on). More currently available missions are offered below.

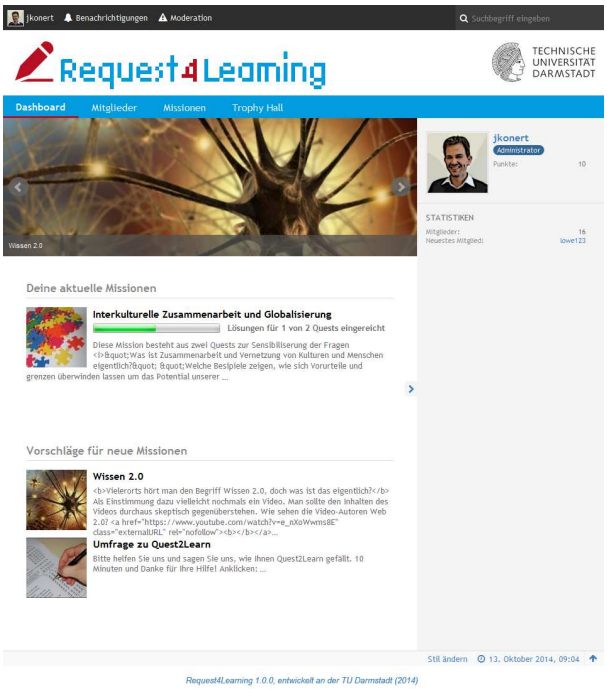

Figure 2: Main screen of R4L after login. The user has currently subscribed to one mission where he finished one of two quests. (All texts are in German due to evaluation scenario).

[2] https://github.com/WoltLab/WCF, last accessed on 30/01/2015

5 Evaluation

For evaluation we added two missions with two quests each to the R4L system. A heterogeneous course of international students was used as participants. The students mostly did not know each other as they were invited from all over Germany to participate in a two-day course on inter-cultural exchange and challenges of globalization.

5.1 Research Focus

The primary research focus was on acceptance of R4L for learning in class or outside and the overall rating of the functionality (interactions provided) compared to established social media systems like facebook or twitter. Second, we aimed for insight whether or not the participants value the didactical possibilities of the concept behind positive. Thus, the questionnaire was structured into the following four parts: demographic data, navigation and technical functionality, social exchange and peer education, and didactic applicability.

5.2 Setup and Scenario

On 11. October 2014 the seminar took place in a youth hostel in Darmstadt with 20 participants (organized by STUBE - accessory studies program for African, Asian and Latin American students in Germany). Within a four hour session they were introduced to the R4L system and they voluntarily got the chance to participate by creating a new account and working on the missions. Some technical issues with the WIFI connection on some Android-devices lead to a minority of participants working in groups of two with one computer. The two provided missions asked them to collect information on the web on intercultural cooperation and the term knowledge 2.0. A third mission was added with only one quest asking them to fill the questionnaire that was linked as a Limesurvey[3]-based online survey. The participants where in one room and they were allowed to communicate online and offline related to the missions' quests.

5.3 Results

13 participants (9f, 4m), aged between 18 and 30 (*m*=24.6, *SD*=4.5), filled the questionnaire. Concerning their social media usage habits they valued R4L similar to facebook and other social learning applications and better as Moodle or twitter (see Figure 3).

The navigational aspects of R4L were accepted with values above 50% and nearly no disagreeing answers at all (see Figure 4). Textual answers revealed the desires to create missions by themselves (not only by teachers) and the opening of embedded Youtube videos in new windows optionally.

In the third category of the questionnaire on social exchange and peer education all aspects were valued primarily positive. Few negative answers were given to statements concerning the exchange and crosslinking with each other.

The major aspects of didactical applicability from the fourth category of the questionnaire were rated very positive. All participants agreed that R4L inspired them to seek actively for solutions, weight different contents and evaluate them (see Figure 6). Most of the participants see a variety of applicable scenarios like lectures, exercises and performance analysis. Only a few are skeptical about the learning objectives behind the missions and whether or not users need to bring some prior knowledge about the topic (see Figure 7).

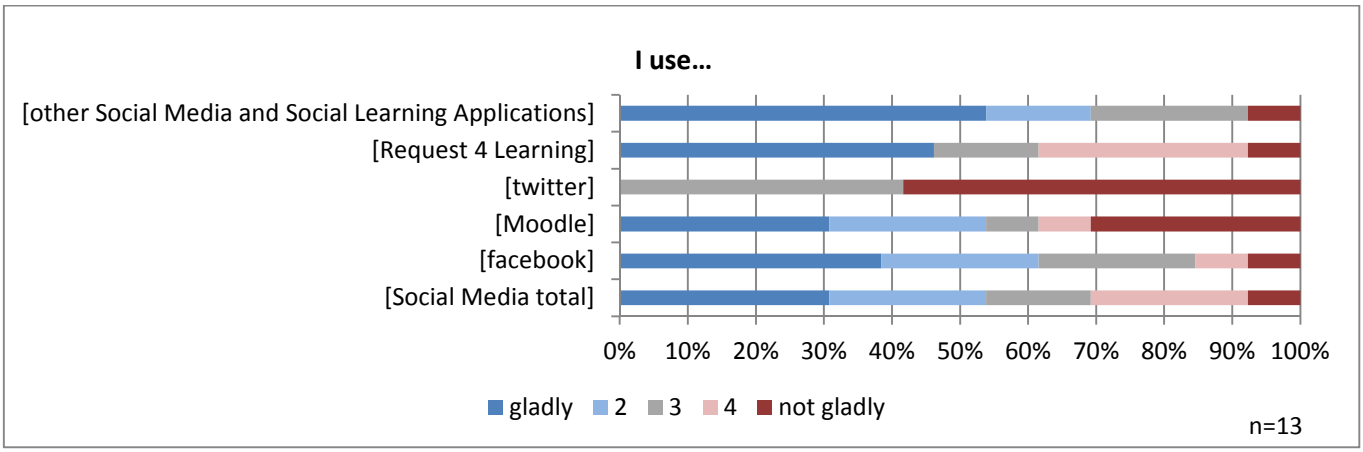

Figure 3: Joyfulness of usage for social media and learning applications

[3] https://www.limesurvey.org/, last accessed on 30/01/2015

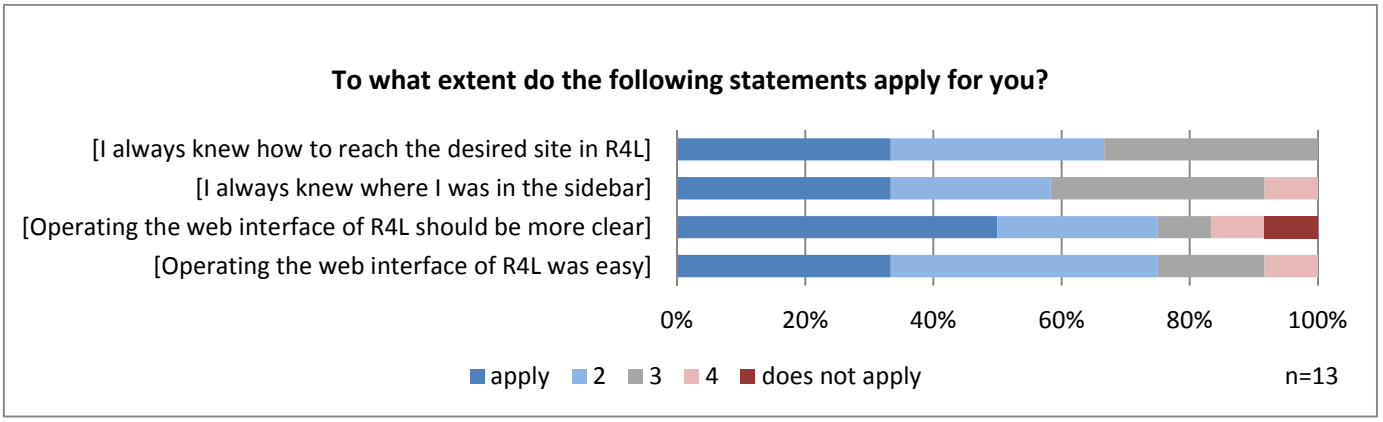

Figure 4: Agreement to navigation statements

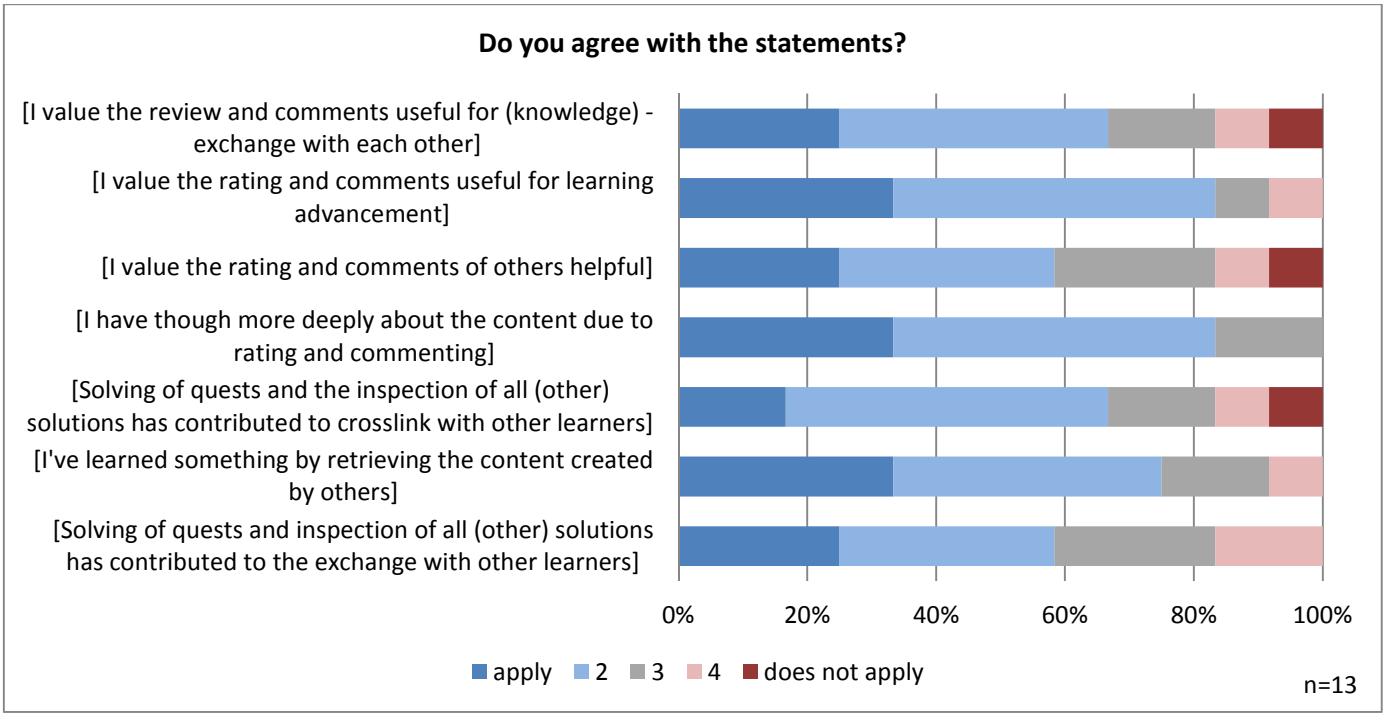

Figure 5: Agreement to peer education statements

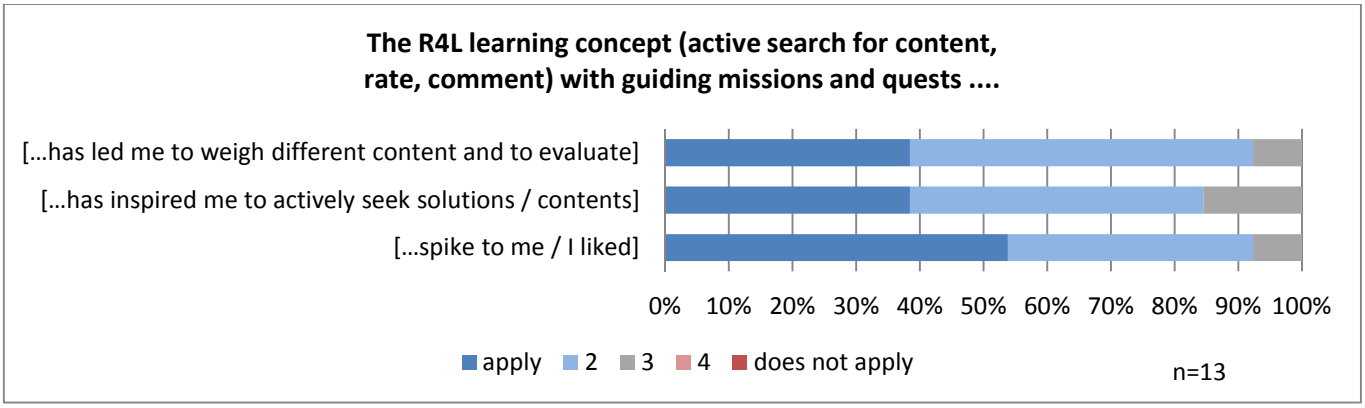

Figure 6: Agreement to R4L concept statements

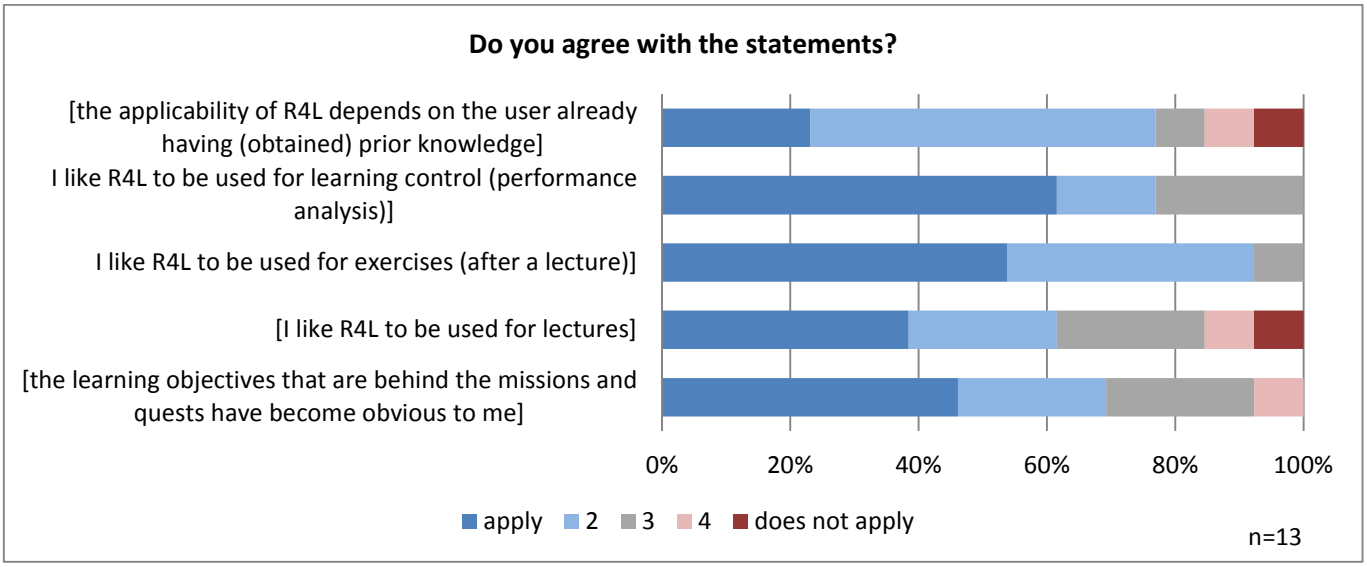

Figure 7: Agreement to applicability of the R4L concept

6 Conclusions and implications for the use of social media learning systems in education

One of the main goals in combining the constructivism-inspired learning theory of connectivism with a game-based learning concept under the hood of a social learning application was to lower the barrier for learnings to actively learn and have fun with it. As shown by the evaluation results in Figure 3 R4L gained more enjoyment rating as Social Media overall or facebook or the commonly used Moodle. While accepting the system in terms of functions and technical implementation (Figure 4), participants admit that beside fun, they as well learned especially by looking at solutions and material found by other learners as well as the provided ratings and comments (Figure 5). Overall the aim of activating learners to seek for solutions by themselves, judge the found material and finally submit such solutions was highly appreciated by the participants (Figure 6). There was not one disagreeing rating on these aspects of the questionnaire. As such it is not surprising that R4L is expected to amend lectures, but especially exercises and performance analysis in presence and blended learning scenarios (Figure 7). These positive feedback encourages further research in the use of social media interactions for serious purposes like learning assistance and game-based knowledge exchange among peers.

The study described in this paper has its limitations though. Only one seminar with 13 participants answering the questionnaire after using R4L only for a couple of hours needs to be further supported by additional longitudinal studies. After extending R4L with further quest types it is planned to use it long-term for a full semester within a computer science course. Then even learning effects could be investigated to prove that R4L positively influences insight into learning topics and improves positive emotional attitude towards the learning goals. Finally such a study has to be supported by logfile analysis to find correlations of system usage, popular click paths and learning outcome.

Overall this study revealed the acceptance and positive attitude of students towards a social media learning application that supports the use of social media interactions and game-based learning concepts which the digital natives are used to when learning by connectivism. As such a system, R4L appears to be one step towards the future learning of where and how rather than what.

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