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Making It Game-Like: Topolor 2 and Gamified Social E-Learning

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Abstract. This paper briefly introduces Topolor 2, a social personalised adaptive e-learning environment with novel gamification features, aiming at reducing undesirable 'noise' effects of social interaction and at further improving the learning experience. The goal of this paper is to showcase the main gamified social interaction features.

1 Introduction

Topolor is a social personalised adaptive e-learning environment, designed to address a particular aspect of adaptive systems and adaptive hypermedia [2], which is that of *social interaction for adaptive e-learning systems*. It is under iterative implementation and evaluation. The first version of Topolor [10] was launched in November 2012, and it has been used as an online learning environment for undergraduate and postgraduate students in Western & Eastern Europe, and Middle Eastern universities. It was designed based on the hypothesis that *extensive social features, personalised recommendations and Facebook-like appearance would make a system more familiar to the learners, and subsequently increase the learning experience*. Evaluations were conducted via real-life learning sessions, targeting various perspectives (e.g., learning behaviour patterns [12]), based on usage data, questionnaire and oral feedback, aiming at investigating the granularity of social interactions and how adaptations can support these, towards the ultimate goal of enhancing learning experience and efficiency. The evaluation results illustrate high satisfaction from the students, as well as a high level of student engagement [9] which indicates that our approach is promising. Nevertheless, some side effects of the extensive social interaction features were also detected, such as 'noise', i.e., students' off-topic conversations through 'chitchat' socialisation [11]. Undeniable is the important role that the informal 'chitchat' plays in motivating and scaffolding peer learning [7] in a social e-learning context - positive social dialogue, e.g., greetings, may help students to relieve anxiety or promote participating in discussions, but reducing side effects whilst maintaining a reasonable scale of informal 'chitchat' - and thus improving learning experience and efficiency in a social e-learning context - is still a crucial challenge to address.

Gamification is "the use of game design elements in non-game contexts" [4] to engage users and promote desirable behaviours. It increasingly attracts researchers'

attention in the education intelligence area, and its benefits have been reported in the recent literature [5, 13]. Considering that gamification and social e-learning have various mechanics in common, such as collaboration, discovery, achievement, loyalty and virality, their appropriate combination may enhance e-learning environments. Therefore, this research introduces a specific blend of light gamification, aimed at reducing side effects and further improving learning experience and efficiency. This paper focuses on the design of these gamified social interaction features.

2 Main Gamified Social Interaction Features

We adopt a *light* gamification approach that applies self-determination theory (SDT) [8] and flow theory [3] to promote intrinsic motivation in existing social e-learning environments, rather than a full-fledged approach that may "over-gamify" the existing mechanics, or even replace the social learning communities that have already formed.

2.1 Peer-reviewed Posting

Topolor 2 introduces a new blend of powerful tools for querying, sharing and filtering the learning resources, as shown in Fig. 1 (a) and (b). It has finer categories especially for sharing, i.e., text, image, quote, link, audio and video (e.g., in Topolor 1, students can only 'share a learning status' as a text). In fact, these categories are widely used in Web 2.0 tools, e.g., Tumblr, and some online teaching/learning platforms recommend teachers to use these external Web 2.0 tools for delivering learning materials, but it is seldom that they are seamlessly integrated in an e-learning system. Additionally, students can express like/dislike for any of these categories of posts, including for comments on a post and the answers to a question. This was introduced for quality control, i.e., to prevent students from abusing social interactions, e.g., by writing an irrelevant comment on a course video. This also encourages them to improve their reputation - a part of a user model, i.e., a learner with higher reputation has benefits, e.g., greater weight in determining peer posts' quality. Additionally, posts can be filtered and sorted based on their perceived quality (as the difference between 'like' and 'dislike' votes from students). More importantly, this method can potentially improve the *quality* of user modelling by filtering out low quality data, as well as reduce the burden of the user modelling process, and thus improve its *efficiency*.

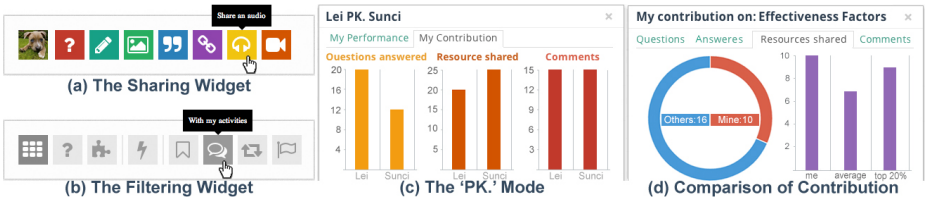

Fig. 1. User Interfaces in Topolor 2

2.2 Visualised Social Status

Topolor 2 additionally provides student profile pages as another information and interaction 'hub', which leads to various features of recommendation, adaptation, personalisation and social interaction. For example, by clicking on a student's avatar in a post list, a pop-up view appears, containing statistics of her learning status, a shortcut to send her a message or to go to her profile page to see her learning status and activities in detail. In a profile page, several gamified social interaction features are provided. For instance, by clicking on the button 'PK.' ('Player Killer', a naming convention taken from games), a pop-up view shows the comparison of performance (e.g., quiz score trends) and contribution (e.g., the number of questions answered, as shown in Fig. 1 (c)) to the learning community between its current viewer and the profile page's owner. Apart from the student profile pages, the graphic and interactive view of contribution and performance allows students to operate *multi-context comparisons* (i.e., in the context of a specific course or a specific topic) and *multi-group comparisons* (i.e., compare to another learner, top 20% learners, or all other learners), as shown in Fig. 1 (d). This can capture learner motivation by triggering competitive instincts [6].

2.3 Adaptive Leaderboard

Leaderboards are embedded into different contexts. They adapt to the students and the learning content by adjusting the way of ordering and displaying student information. For instance, in a course page, the students can be shown based on how many topics in this course they have learnt, while in a topic page, they can be shown based on how many questions related to the topic they have answered correctly. Students can adjust the order, and Topolor remembers their preference for the next time. Each item on the leaderboard can be separately viewed as a student 'info-card', containing her learning status information, buttons for sending her a message or seeing her profile page. Additionally, the information on the item is device-adaptive, e.g., for a certain size of the browser, smaller icons replace big ones and text information. In Topolor 2, leaderboards create a sense of community and provide opportunities for students to directly interact with others and compare their learning progress to others, because students see their status publicly and can be instantly recognised.

3 Conclusion and Future Work

In this paper, we have presented the main gamified social interaction features in Topolor 2, a social personalised adaptive e-learning environment. We have adopted a specific blend of *light gamification* approach that applies motivational theories and symbiotically builds gamification mechanics upon social interaction features, in order to promote intrinsic motivation in existing social e-learning environments, without replacing the social e-learning community that has already formed.

The preliminary evaluations using online survey were performed and showed both high usability and appreciation of the new gamified social interaction features introduced (the *SUS* [1] *score* of Topolor 2 was 73.9% with σ=13.7, median=75). The oral feedbacks received also showed that the students wanted to have more lessons in Topolor. Decisive in this, we believe, was the fact that gamification mechanics made the social interaction enjoyable that is essential to consider in designing such systems.

Additionally, we have collected usage data from Topolor's logging mechanism when the students were using Topolor in their online lesson sessions, and we have already started analysing these usage data to evaluate each of the new gamified social interaction features in detail, in order to investigate the effect of each of them on learning experience and learning efficiency. Noteworthy is the fact that, though most comparisons hide personal data and deal with averages, the popular "PK." mode, where a 'player' can compare with one other 'player' may raise ethical issues which further need evaluated. Therefore, our future work also seeks to solve this issue, e.g., by introducing a privacy management mechanism to allow learners to expose data to different groups in different ways.

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