Extended Abstract

Evaluating the user experience of a financial e-learning platform featuring gamification and personalization services (provisional title)

Aikaterini Katmada[a], Sotirios Diplaris[a], and Ioannis Kompatsiaris[a]

[a]*Centre for Research and Technology Hellas - Information Technologies Institute, Thessaloniki, Greece*

{akatmada, diplaris, ikom}@iti.gr

Keywords: usability; user experience; user testing; e-learning; financial literacy; gamification; incentive mechanisms

Abstract

Recent advances in the field of Information and Communication Technologies (ICT) have contributed to a considerable increase in the human knowledge capital (Vassileva 2008), and led to the "information age" which is characterized by wide diffusion of information (McLoughlin and Lee 2007). Additionally, connectivity and the emergence of the Web 2.0 –the "Participative Web"– enable users to become active contributors and creators of content (Vassileva 2008). These technological advancements are also altering the educational landscape. Applications such as social networking sites, blogs, wikis, and crowdsourcing platforms allow users of various educational levels to take active part in the knowledge-creation process. Meanwhile, organizations and educational institutions are increasingly investing in ICT in order to improve the educational or training services they offer (Zaharias and Poylymenakoy 2009);

According to Welsh et al. (2003), *e-learning* entails the use of computer network technology over the Internet, in order to provide information and instruction, more commonly in an asynchronous way. It is based on various educational philosophies, as well as the use of technological tools that are Web-based, Web-distributed or Web-capable for the purposes of education (Nichols 2003). It includes, among others, online

learning, virtual classrooms, and digital collaboration (Keegan 2002). E-learning appeals to organizations that want to deliver training to many people across multiple locations, track learner progress in an automatic way, and reduce operational costs (Welsh et al. 2003). Successful e-learning, however, requires thorough planning, and there are implementation issues impeding the effective use of e-learning and contributing to high dropout rates. These include, among others, up-front costs for the organization, lack of interaction among trainees, as well as use of non-interactive (static) content and tools (Welsh et al. 2003).

Poor usability of e-learning platforms can also be considered a critical factor; moreover, it is argued that research should move beyond the traditional usability evaluation, which is focused on functionality, and take into account user affect (Zaharias and Poylymenakoy 2009). This is in line with the survey of Law et al. (2009) on user experience, who refer to the limitations of the traditional usability framework and allude to the more general shift of focus to user affect, sensation, and the value of Human-Computer Interactions in everyday life. More specifically, user experience encompasses both *pragmatic qualities* (traditional usability considerations, such as perceived efficiency, effectiveness, and safety) and non-task-related aspects or *hedonic qualities*, such as identification, stimulation, e.g. personal growth and knowledge increase, and pleasurable emotional reactions (Bevan 2008).

Accordingly, the particular paper is focused on examining the overall user experience and user attitudes towards an online platform that seeks to promote financial awareness and capability, developed by the EU-funded "PROFIT" project[1]. Financial awareness can support citizens in taking informed financial decisions, leading to more responsible financial behaviour and active forms of citizenship. Towards that end, the PROFIT platform incorporates various functionalities, such as specialized educational material available to the wider public; interactive quizzes helping users assess and improve their financial literacy level; articles from trusted online sources; a Questions and Answers forum; and financial forecasting tools for more advanced users. Additionally, the PROFIT platform lets users become authors and providers of content, i.e. articles, discussions, ratings, and opinion polls.

---

[1] Project PROFIT (Promoting Financial Awareness & Stability) has received funding from the European Union's Horizon 2020 Framework Programme for Research and Innovation under grant agreement no 687895.

In order to promote user engagement, various incentive mechanisms aiming to increase user participation and contributions were incorporated in the design of the platform. More specifically, following a user-centred design process, specific user needs and wants were identified in given contexts; afterwards, a reputation-based incentive scheme with integrated gamification elements was designed and implemented (Katmada et al. 2016). Reputation metrics are used in order to regulate the quality and quantity of user contributions, through user ratings, and provide appropriate rewards. Gamification is defined as *"the use of game design elements in non-game contexts"* (Deterding et al. 2011) and is usually applied in consumer-oriented web and mobile applications, in order to trigger intrinsic motives and increase user motivation (Suh et al. 2015; Morschheuser 2016). Gamification has its roots on the ongoing interest in the use of computer games for learning purposes, given the fact that games contain elements of challenge, fantasy, and curiosity (Malone, 1980) that render them intrinsically motivating. So far, there are several publications on the use of gamification in education; however, according to Dicheva et al. (2015), true empirical research on the effectiveness of gamification in learning environments is still scarce.

Gamification on the PROFIT platform acts as an additional "service layer" of the reputation system presenting the user with game-design elements, such as avatars, points, badges, levels, and a leader board. While gamification might appeal to younger users, other incentive mechanisms such as social functionalities, might appeal to other target user groups. Following a first test cycle with both test users and experts, this mechanism was further enriched. Furthermore, another important aspect of the user experience on the PROFIT platform and part of the incentive mechanisms are the personalisation services, which aim at providing recommendations based on user preferences as these are expressed through explicit ratings of items on the PROFIT platform, as well as through user interactions with the platform. A hybrid recommender system provides to each user recommendations of content, as well as peers with similar interests to interact with, to each user. Quite commonly, research on recommender systems is focused on the accuracy of the prediction algorithms. However, a number of recommender evaluation frameworks that adopt an integrated user-centric approach have been proposed lately (Knijnenburg 2012).

In order to assess the user experience for the particular platform, and especially the parts that are relevant to the gamification and recommendation system, a usability evaluation with 12 participants was initially carried out. According to Nielsen (2000), 3-

4 users from each distinct target user group are needed in order to ensure that the diversity of behaviour is covered within the group. In order to satisfy this condition, we chose 4 people from three financial literacy level user groups, as identified by a preliminary financial literacy test and their vocation. Throughout this moderated user testing, users were asked to perform a number of specific, brief tasks on the PROFIT platform, following the talk-aloud protocol. The tasks were focused on registering and setting up a user profile, accessing the user dashboard (where gamification elements and recommendations can be found), interacting with the learning and social interaction parts of the platform and gaining points and badges for that interaction. Key metrics, including completion time, number of errors, perceived difficulty, and success rate for each one of these tasks were used in order to quantify user feedback.

Moreover, in order to evaluate the effect of the above-mentioned incentive mechanisms and recommender system on users' attitude towards the platform, we ran a second, longitudinal user testing activity with two user groups: control and experimental. The experimental group consisted of 6 new users of various financial literacy levels while the control group were 6 users from the first testing activity that were willing to participate in this activity. The two user groups were both asked to use the financial literacy platform for several weeks and complete a specific number of educational thematic units. The testing variable were the incentive mechanisms, i.e. gamification elements and personalized recommendations. These elements were "hidden" from the users of the experimental group. It should be noted that at the end of this activity, both user groups were asked to complete a short questionnaire on perceived satisfaction, ease of use, and appeal, based on Lund's USE Questionnaire (USE) (2001). Additionally, the control group answered a few questions pertinent to the user experience of the gamification elements and recommender system. Participation levels and test scores of both user groups were tracked and compared.

The particular case study provides a comprehensive overview of related gamified e-learning and financial education platforms, as well as pertinent evaluation studies. Afterwards, the basic features as well as the incentive mechanisms of the PROFIT platform are being presented and, subsequently, there is a description of the particular evaluation activities. Finally, the results of the study are being discussed and some conclusions are drawn on the basis of the findings.

References

Bevan, Nigel. "UX, usability and ISO standards." In CHI 2008 Workshop on User Experience Evaluation Methods in Product Development, pp. 1-5. 2008.

Deterding, Sebastian, Dan Dixon, Rilla Khaled, and Lennart Nacke. "From game design elements to gamefulness: defining gamification." In Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments, pp. 9-15. ACM, 2011.

Dicheva, Darina, Christo Dichev, Gennady Agre, and Galia Angelova. "Gamification in education: A systematic mapping study." Journal of Educational Technology & Society 18, no. 3 (2015).

Katmada, Aikaterini, Anna Satsiou, and Ioannis Kompatsiaris. "A Reputation-Based Incentive Mechanism for a Crowdsourcing Platform for Financial Awareness." In Collective Online Platforms for Financial and Environmental Awareness, pp. 57-80. Springer, Cham, 2016.

Knijnenburg, Bart P., Martijn C. Willemsen, Zeno Gantner, Hakan Soncu, and Chris Newell. "Explaining the user experience of recommender systems." User Modeling and User-Adapted Interaction 22, no. 4-5 (2012): 441-504.

Law, Effie Lai-Chong, Virpi Roto, Marc Hassenzahl, Arnold POS Vermeeren, and Joke Kort. "Understanding, scoping and defining user experience: a survey approach." In Proceedings of the SIGCHI conference on human factors in computing systems, pp. 719-728. ACM, 2009.

Lund, Arnold M. "Measuring usability with the use questionnaire." Usability interface 8, no. 2 (2001): 3-6.

McLoughlin, Catherine, and Mark Lee. "Social software and participatory learning: Pedagogical choices with technology affordances in the Web 2.0 era." (2007): 664.

Morschheuser, Benedikt, Juho Hamari, and Jonna Koivisto. "Gamification in crowdsourcing: a review." In System Sciences (HICSS), 2016 49th Hawaii International Conference on, pp. 4375-4384. IEEE, 2016.

Nichols, Mark. "A theory for eLearning." Educational technology & society 6, no. 2 (2003): 1-10.

Nielsen, Jakob. "Why you only need to test with 5 users." (2000).

Suh, Ayoung, Christian Wagner, and Lili Liu. "The effects of game dynamics on user engagement in gamified systems." In System Sciences (HICSS), 2015 48th Hawaii International Conference on, pp. 672-681. IEEE, 2015.

Vassileva, Julita. "Toward social learning environments." IEEE transactions on learning technologies 1, no. 4 (2008): 199-214.

Zaharias, Panagiotis, and Angeliki Poylymenakou. "Developing a usability evaluation method for e-learning applications: Beyond functional usability." Intl. Journal of Human–Computer Interaction 25, no. 1 (2009): 75-98.