

Social Comparison in Behavior Change Support Systems: Heuristic Evaluation of a System's Usability

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Abstract. People's willingness for sharing personal data with others allows designers to consider utilizing social comparison functions into behavior change support systems. Behavior change applications, which enable social comparison, seem to be gaining popularity nowadays. Usability flaws may diminish the usage and engagement of behavior change support systems, therefore attention was paid to usability issues in this particular case. Following usability guidelines early enough in the design may save time and resources.

Keywords: Behavior change support systems, Persuasive Systems Design, Social comparison, Usability, Heuristic evaluation, Recovery from work.

1 Introduction

Systems are constantly evolving towards sharing data, even personal data, and even though the evolution can be difficult to predict, people seem to want to share data with groups of different people [1]. Mobile applications for health behavior change have gained popularity during the past few years and for example in 2013 approximately 15% of top-ranked health behavior change applications (n=167) for physical activity utilized social comparison as a behavior change technique [2]. In 2014, another study searched for the presence/absence of behavior change techniques from top-ranked (n=40) physical activity/dietary behavior applications and social comparison was present in 55% of the applications [3].

Social comparison in fitness applications enable comparing one's own progress and performance with that of others, thus providing greater motivation for the user and potentially enhancing performance [4]. Nevertheless, when implementing social comparison function into a mobile application, the designers should take into account that the usage might be dependent on the user's personality. Personality type might affect how the user feels about social comparison functions, from being pressured to encouraged, or even ignoring the function altogether [5].

Nevertheless, the preferences for sharing data are quite dependent on the individual sharing [1], and as there might be people that might be willing to share very personal data about their life, there will most probably also be people that might be unwilling to share any information that can be directly linked to them. The idea of anonymous social

comparison could be the solution for this problem, since one could for example compare one's performance against a group that resides in the same geographical area or have similar health issues.

In Promo@Work research project, a health behavior change support system (HBCSS) [6] was designed with the help of Persuasive Systems Design [7] methodology. *Social comparison* features were implemented into the HBCSS and in this study, we intended to do a heuristic evaluation of the *first* social comparison feature visible for the users: proposition of health problem domain based on group level health issues. Therefore, the research objective for this study will be to generate a 'lessons learned' list of usability issues regarding the social comparison proposition interface.

2 Study setting

2.1 Background

Goal setting plays an important part in the PSD model and design principles such as *social comparison* could potentially help the user to achieve personal goals by enhancing motivation. Enabling the sharing and comparing personal data and information in a system for the users will potentially enhance the users' motivation to perform the target behavior for the goal they have set for themselves. [7].

The social comparison theory hypothesizes that peoples' behavior is affected by the behavior of other people. Social influence processes and competitive behavior can be derived from the same socio-psychological process: self-evaluation, which is based on comparison with other people. [8].

2.2 System

The HBCSS was developed as a native mobile application for Android-operating system. Self-determination theory [9] was used as the theoretical background for behavior change techniques, whereas Transtheoretical model [10] was adopted for 'stages-of-change' goal setting within the application. The intended objective for the app was to help entrepreneurs to recover from work-related strain and stress. The seven health problem domain in the application were recovery from work, sleep, time management, physical exercising, excessive sitting, stress and dietary habits.

When implementing a social comparison function into the mobile application, we had to think of a way to adapt the idea so that it would both fit the content of the application and support the motivation of the users without arousing competition between them. Before the users will gain access to the content matter, the application will inquire the users about their previous health behaviors by 52 questions. The users will be encouraged to answer the questions, but it will not be obligatory in order to proceed within the application.

After the inquiry, the mobile application will propose two different content modules for the users, which will be based on their personal answers and the users will be able to choose either one or skip the proposition altogether. An algorithm calculated the propositions and the mobile app proposed either the second best (least problems within

a health domain) or the second worst (most problems within a health domain) content modules for the user.

After next login, another set of propositions will similarly be provided for the users, but this time the propositions will be based on the answers of the whole user base, thus on *social comparison*, which is informed for the user. The algorithm will calculate the second best (least problems in health problem domain) and second worst (most problems in health problem domain) health content domain modules from the whole user base and propose them for the user. This paper will concentrate on the usability issues of the aforementioned social comparison proposition.

Additionally, the app also had two self-monitoring tools, which were based on social comparison. The tool for stress statistics relied on user-perceived and inputted level of stress, while showing the users the average level of the whole user base. The tool for self-perceived recovery worked similarly, with the exception that a weekly reminder was sent for the users via push notification, whereas one could give input daily in the other tool.

2.3 Research method

According to Nielsen [11], heuristic evaluation is used for finding usability problems in a user interface design and consists of an examination of the interface while comparing its compliance with heuristic usability principles. For this study, the emphasis on the evaluation is ‘Ex Post’ [12], thus evaluating a finished product rather than one that could be fixed in an iterative product development cycle.

3 Heuristic evaluation

Each heuristic evaluation principle was compared to the social comparison proposition interface of the HBCSS. The results of the evaluation analysis will be provided within separate headlines of each principle in the current chapter, and will be discussed in the next one.

Visibility of system status. It could be said, that the users will be informed on what is going on at the beginning, as the function will be explained for them. Nevertheless, the social comparison proposition only appears once, while it could have been a better solution to make another proposition later on based on the choices of the users.

Match between system and the real world. The proposition will not be presented for the users in system-oriented terms. Therefore, the social comparison proposition for a health problem domain should be a familiar concept for the users.

User control and freedom. The users could exit the proposition with a single push of a button within the interface. If they would choose the proposed health problem domain by accident, they could still exit it via ‘home’ button. Unfortunately, re-doing will not

be supported by the app interface, but instead the users will have to choose the domains themselves.

Consistency and standard. The social comparison proposition could be considered consistent with the first non-social comparison proposition. Navigation functions similarly with both, while adhering design standards of similar interfaces.

Error prevention. Errors were inherently prevented by the design, because the social comparison proposition would be preceded by a proposition based on the users' personal answers on first login. Therefore, at least ideally, there should be enough answers on a group level to calculate a proposition based on social comparison before the proposition will be triggered.

Recognition rather than recall. Unfortunately, the interface (including the social comparison function and the app) will not support users in retrieving the proposition later on, which was a clear flaw in the design, because the users will have to remember the proposition, which could be easily forgotten amid the flood of information.

Flexibility and efficiency of use. The proposition interface could be said to be efficient, as the propositions are differentiated in separate buttons, giving users quick access to navigate forward.

Aesthetic and minimalist design. The design could be said to be minimalist without any excessive information. The information content could be absorbed with minimal concentration, but some users might just skip the proposition without reading it, as one could push the button of either health domain proposed or skip' button instantly. A suitable alternative might have been to delay the option for the buttons for a few seconds in order to give the users extra time to decide on their stand regarding the social comparison proposition.

Help users recognize, diagnose, and recover from errors. Unfortunately, the interface might express potential errors poorly, as in an error situation, the proposed health problem domain might be shown only as zeros to the users, instead of an error message popping out. Nevertheless, the design was planned in a way that there should be no errors, but still an error message should have been enable just in case.

Help and documentation. Help and documentation regarding the social comparison proposition were scarce, or non-existent. On the other hand, the information provided on the proposition should be more or less clear for the users, therefore there would be no need in this case to provide extra information about the function for the users.

4 Discussion

Designing functionalities into applications might at times be difficult, especially if the user-base is wide. Iteration during development process could save designers from many usability pitfalls. Overall, the interface design could be said to be functional and usable, but there were two usability flaws.

Table 1. Nielsen's heuristic principles [11] and evaluation results

Usability principle	Explanation
Visibility of system status	Users will be informed, but proposition only appears once
Match between system and the real word	Words, phrases and concepts should be familiar to the users
User control and freedom	Exits are supported, but redoing the proposition is not
Consistency and standards	Platform conventions are followed
Error prevention	Errors prevented by design
Recognition rather than recall	Retrieving the proposition is not supported
Flexibility and efficiency of use	Navigation is quick
Aesthetic and minimalist design	Minimalist design and no excessive information
Help users recognize, diagnose and recover from errors	No proper error message, but should be no need
Help and documentation	Help and documentation scarce, but the information is provided clearly in the proposition

The users should be allowed to re-do, in other words go back to, the social comparison proposition. It could be assumed that when using a HBCSS with extensive content for the first few times, it might be difficult to absorb and comprehend all the information provided. The other flaw was that the users could not check from anywhere what the social comparison based health problem domain proposed for them was. In case the users will accept the proposition, and remember the problem domain themselves, they will be able to navigate into the right domain module independently. Otherwise, the social comparison proposition might be lost for them.

5 Conclusion

Despite the usability flaws in the interface, it could be said that otherwise the social comparison proposition was relatively easy to use and comprehend. Following usability guidelines early enough in the design may save time and resources. Avoiding the reported pitfalls described in this paper may help researchers and designers in their social comparison feature implementations.

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