Towards Better Behavior Change Models For Rich User Experiences

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Abstract
This paper provides an overview of the current research activity at Leeds Metropolitan University which relates to the convergence of User Experience Design and Behavior Change Theory. These traditionally separate research fields with their roots in HCI and Psychology are identified as an emerging area of interest. We present our current work on a website facilitating weight loss which was originally created to model face-to-face coaching methods for participants of an annual weight management summer camp. This is on-going work and at the time of the workshop we will have completed stage one of a four stage development aimed at introducing formal behavior change models into the website user experience.

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Behavior Change, User Experience, Coaching, Obesity, Heuristics Evaluation, Expert Review

ACM Classification Keywords
H.5.2. Information interfaces and presentation (e.g., HCI): User Interfaces – Evaluation/methodology
J.4 Social and Behavioral Sciences: Psychology

Introduction
In this position paper present our on-going work in the

Leeds Metropolitan University concerning evaluation and re-design of a weight management website. This is part of a wider focus on the analysis and design of digital tools for health, wellbeing and facilitating positive behavior change.

Tackling Obesity

We collaborate with a local organization that focuses on tackling obesity through weight management programs to individuals, families, communities and workplaces. The programs are heavily reliant on using ICT as a vehicle for education, outcome tracking and fostering behavioral change. The company is currently supporting up to 8000 adults and 3000 children.

The web platform for the organization is being developed on an on-going basis. At present no formal research activity has been undertaken alongside the current platform, although the organization itself emerged from successful research activity in the sports and coaching discipline. The aim of the collaboration was to initiate research that will lead to improved engagement with the platform and consequently better overall outcomes.

We are currently analyzing the weight management website which supports users in monitoring their progress and setting weekly goals. The website is undergoing a re-design of the front-end user experience, as well as some back-end elements. The long-term aim of the re-design is to formally introduce behavior change theory into the progress monitoring and goal setting tasks. The partners involved have a wealth of knowledge and experience in supporting people through face-to-face coaching, and the current version of the website was designed to mimic this traditional face-to-face interaction closely. Whilst this was a suitable design choice initially, team members quickly realized that the website had low usability and did not collect all the data required to fully support participants remotely. For example, there was no way to extract detailed information about participants' progress and where they were in the behavior change stage model – a common problem with web-based approaches [1].

In response, the team decided to re-design the front-end of the website and to increase the amount of information collected at each point of contact by participants. This re-design was based on the support teams' experiences and opinions of the current website.

Our research, the first phase of which we present in this paper, aims to formalize the interaction design process and to base it on established behavior change models. We also investigate whether and how behavior change models need to be adapted to work in an age where the expectation of having good utility and a pleasurable user experience are extremely high.

Our approach can be broken down into four phases:

1. Evaluate re-designed website and observe it in use
2. Map established behavior change models against the existing weight management support model
3. Adapt behavior change models for effectiveness and rich user experience
4. Design new digital tools (likely to be mobile) to better support positive behavior change.

At the time of the workshop we will have completed phase one and started on phase two.

Website usability evaluation

During July 2012 we evaluated the new version of the weight management website prior to its release for use at the 2012 weight management summer camp. The aim of the evaluation was to maximize usability and user experience for the subsequent phase of controlled user observations.

The annual summer camp is typically attended by children between the age of 4 and 17. They take part in group activities and are given advice on nutrition and behavior. Participants set themselves long term weight loss goals. During the last week of the summer camp, participants are introduced to the website which is designed to help them monitor their progress and set themselves weekly goals regarding changing their nutrition and activity behavior.

Method

We chose the expert review method because of its effectiveness and cost-efficiency in discovering usability problems. The method that is probably used most often is the heuristics evaluation [2].

Heuristic evaluators look for problems in an interface's compliance with a set of heuristics for usability guidelines. Nielsen and Molich found that 3-5 novice evaluators find 40-60% of known issues when applying heuristic evaluation.

A version of the usability heuristics was published together with the method. However, we used the ISO 9241 set of heuristics which constitute an internationally agreed standard [3]. The standard refers to interaction as a "dialogue" and describes seven dialogue principles, listed in table 1.

Procedure

Three HCI specialists conducted an expert review of the website using the ISO 9241 set of heuristics. Heuristic evaluators were asked not to comment on aspects of graphic design or the wording of content, unless they were instructions for website use. The critical tasks evaluated were:

1. Login
2. Set up profile (personal and physical data)
3. Check and confirm profile summary (with calculated BMI and Basal Metabolic Rate)
4. Set weight loss end goal (reduce or maintain weight, confirm time to reach goal)
5. Select weekly goals (Weight loss, Eating habits, Activities)

The evaluation revealed a number of usability problems with the new website. Overall 16 distinct problems were found, each one classified as falling under one or more of the usability heuristics. There was high consistency between the evaluators. The following table shows details and occurrences of each heuristic:

Heuristic	**Occuren-ces**
1. suitability for the task (the dialogue should be suitable for the user's task and skill level);	3
2. self-descriptiveness (the dialogue should make it clear what the user should do next);	2
3. controllability (the user should be able to control the pace and sequence of the interaction);	3

4. conformity with user expectations (it should be consistent);	6
5. error tolerance (the dialogue should be forgiving);	6
6. suitability for individualization (the dialogue should be able to be customized to suit the user);	2
7. suitability for learning (the dialogue should support learning).	2

Table 1. Heuristics and their occurrences.

The key problems we found can be summarized as:

- The website employed an unusual navigation metaphor. Many dialogues were part of a sequence of steps to go through (often called a 'guided dialogue wizard'). The visual metaphor for presenting wizard steps and progress were tabs. However, tabs are most often used to break down and organize larger bits of content.

- Users who entered correct and complete data in all forms had no issues going through the dialogues. However, mistakes or omissions often lead to confusion because of inappropriate error messages or non-sensical input data being accepted and leading to non-sensical feedback later on.

- The behavior matrix (see figure 1) which guides the user through the various stages of their behavior change was confusingly labeled. For example, users were asked whether they do a certain behavior change 75-100% of the time. In one instance the behavior was non-ambiguously labeled "Monitor Food and Drink". However, another behavior was labeled "Fatty and Sugary Foods" – which could mean eating more of these, or less of these.

- The behavior matrix did allow for behavior change in one direction only – users could only improve. It was not possible to record regression, although this is quite possible to happen for some of the study participants.

Following our recommendations, changes were made to the website prior to user observations, which are outlined in the next section.

Website user observations

During August 2012 we observed 19 summer camp participants during their use of the weight management website. Observations took place on camp as part of the normal daily routine campers went through. Two sessions were observed:

Session 1: During the initial session, users set up their profile and enter their long-term weight loss goal. They also enter details of their current activity pattern and their current eating pattern, in the form of a behavior matrix (see Figure 1). Based on this information, the website then calculates what the recommended daily calorie intake is and how long it would take the user to achieve their desired weight loss goal. The user then sets short-term goals for the next 7 days. These goals relate to a) weight loss; b) change of two activity patterns; c) change of two eating pattern.

Session 2: A week later, users recorded weight loss progress and reviewed their short term goals. They were encouraged to set themselves different activity

and eating habit goals each week, using the behavior matrix. The matrix fostered constant reflection on awareness, current behavior and future goals by presenting 7 levels of involvement for each behavior (see figure 1). After each session, a focus group discussion was held with all participants.

Findings

By the time of writing, we collected only 4 weeks of data from the weekly weight logging, goal reviews and behavior pattern changes. It is clearly too early to suggest any findings from this data.

Incidentally, during observations we captured some of the participants' computer activities before and after the task. A pattern quickly emerged: Before the task, many participants played computer games they found on the internet to pass the time while they waited for everything to be set up. After the task most participants explored their personal profile and changed their profile picture, updated their status and checked other participants' statuses. This was rather revealing as it gave an indication of what other, more playful, activities might capture their attention and potentially entice them to come back to the website more often than they would when the only activity was the weekly task completion.

The focus group discussions revealed that participants were generally happy with the website interface and functionality. They welcomed the autonomy they felt when setting their goals, a factor previously identified as being a strong positive indicator for long-term behavior change [4]. Several suggestions were made regarding further development of the website:

Addition of games that help with identifying 'good' and 'bad' behavior; tools to communicate with other users e.g. sharing, friend circles and chat rooms; and a mobile version of the site for more instant access

Future Work

We will continue to collect data from participants in a longitudinal study with the aim to analyse the behavior changes measured and logged through the website.

Further, we plan to introduce social community elements into the website, particularly those that let users communicate with each other and share their experiences. Webb et al [1] found that such normative information about others' behavior had a positive effect on behavior change – more so than information about others' approval or disapproval.

We also intend to explore the development of serious games to complement the weekly task of monitoring, goal review and new goal setting.

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Figure 1. Behavior matrix logging current behavior and setting goals for the following week