

Measuring Your Best You:

A Gamification Framework for Well-being Measurement

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Abstract— Well-being is a multifaceted concept, having intellectual origins in philosophy, psychology, economics, political science, and other disciplines. To date, methods to assess well-being are performed infrequently (e.g. yearly) and superficially; resulting in highly aggregated observations. Our objective is to create a measurement framework for assessing (human) well-being with a much higher observation frequency (e.g. daily). In decreasing the time between observations of well-being, we believe that better processes for the management of social groups and communities (e.g. a workforce) can be implemented. In this paper, we discuss our experiences and findings from the implementation of a gamified Facebook application for the measurement of well-being. We pay special attention to the accuracy of well-being observations, and the efficacy of various gamification incentives on continued use by users. Our results show that gamification provides a suitable environment for extracting accelerated, realistic, truthful self-reporting for the measurement of human flourishing.

Keywords—Social network design, Well-being, Gamification

I. INTRODUCTION

High levels of well-being are good for individuals and for society as a whole. While this does not sound surprising, it has repeatedly been verified by longitudinal and experimental studies: Good well-being inter alia supports “effective learning, productivity and creativity, good relationships, pro-social behavior, and good health and life expectancy” [1, p. 838]. As such, well-being is a research area that is of natural interest in psychology and sociology. Yet, knowing well-being levels of individuals, and their history, can also have practical implications that are directly applicable: They can help managing complex communities or institutions beyond the less precise instruments employed today. Examples for current instruments are turnover rates, performance assessments, and absentee tracking [2]. Notably, it can be assumed that a significant drop in the projected long-term expectation of an individual’s or a community’s well-being is a clear indicator that calls a community manager to action – and provides a strategic advance to those community managers that are in possession of a tool that enables the evaluation of such measures [3]. The effectiveness of such a tool depends on suitable data: It must be suited to reliably reveal the actual well-being level of individuals as a comparable measure and it must represent such levels timely distinct, yet close enough to enable the construction of trends and their analysis. Together, this would allow for the precise tracking of well-being over time.

Currently, well-being surveys are conducted infrequently, and their focus is not to collect data for near-real-time tracking, but rather for the observation of the current state. An example is the European Social Survey (ESS), a large-scale international survey which tracks myriad indicators on quality of life across Europe [4]. Another well-known approach employed by survey institutes is to contact randomly selected participants by telephone, in an attempt to acquire data from ever changing respondents. Both approaches are not applicable to support community management as they are not continually individually reported.

Hall et al. proposed a mechanism to collect repeated well-being data in a cost-efficient and in a near-real-time manner. Here data is to be captured in an online setting that creates a game-like context by applying gamification methods [2]. Gamification seeks to transfer elements that can typically be found in games (like points and reward systems) to other application areas. In doing so, the other areas are to benefit from the positive attitude human beings usually have towards games, or playful behavior. The playful makeup has the aim to engage users and to improve their experience of tasks that otherwise are not perceived to be very appealing. Applied to “BeWell: A Game of You on Facebook”, the task of collecting well-being data is to be packed into a more engaging setting [2]. This way, users are motivated to voluntarily and continuously provide data that enables calculation of the above mentioned Human Flourishing – finally allowing for smart community management [3]. Gamification circumvents potential negative perceptions of what is otherwise a standard online survey. As an additional advantage, BeWell can be extended with social incentives that lead to popular propagation within users’ social graphs. By doing so, potential entrance barriers for its usage are lowered.

However, bringing gamification incentives to a specific area is not a simple task, for their effectiveness has several dependencies, namely the specific area itself [5,6] and user personality [7,8]. This leads to the necessity to investigate the effectiveness of well-known gamification incentives and their combination when applying gamification to a new application area. Therefore, to investigate how gamification can assist in the collection of data for the study of well-being, we implemented a gamified framework for the measurement of Human Flourishing as an extension to the model presented in Hall et al. [2].

The core research question that we address in this paper is: Can gamification structures be applied to a survey application for measurement of Human Flourishing that yields both continued

participation and truthful self-reporting? In addressing this question, we hope to identify whether adding gamification to a well-being data collection process has a motivational effect on continued use, and if users are incentivized to answer truthfully. This work is the implementation and extension of [2,3].

The paper is structured as follows: section II reviews well-being, concentrating on human flourishing, to gamification and the marriage thereof in the form of BeWell: A Game of You on Facebook. Section III presents a brief overview of BeWell's implementation. Section IV, presents the results of the BeWell's performance and a short user satisfaction survey. Section V discusses the factors contributing to continuing usage. Sections VI and VII present limitations, future work, summarize the paper.

II. RELATED WORK

This section is a brief overview of current well-being and gamification literature, with the focus on understanding of well-being and gamification for their combined application.

A. Well-being

An initial look at the concepts of positive and negative affect shows that the baseline definition is still in development. Well-being, or the presence of positive affect and the absence of negative affect, is broadly defined as "...the optimal psychological functioning and experience" [9, p.142]. A further look into the existing definitions of well-being reveals two major traditions in the philosophy. The first of these traditions is hedonism, which postulates the goal in life as maximization of the positive and the minimization of the negative. This focus on hedonistic moments leads to the assessment of experienced moments and life elements on a good/bad affect scale [10,11].

The other major tradition concerning the definition of well-being is eudemonism, or pursuing the goals which make one the most true to oneself. Eudemonism emphasizes personal growth and personal effort in order to flourish [9]. True happiness is sought to be found in the expression of virtue, even if it's neither easy to do nor free of pain. The main goal in life is seen as the detection and utilization of the true potential of a human being in order to be well. Where the hedonistic approach focuses on the well-being as a state of subjective happiness and the experience of pleasure, the eudemonistic approach focuses more on the meaningfulness within life and the urge to complete goals which make one a better person. While the measurements are divergent, the two strains cover the most important facets of measuring affect. Positive and negative affect are perceived by the totality of the "little things" and striving for higher order betterment [9].

B. Human Flourishing

Elaborating on the idea to view well-being as a multidimensional concept, but to include hedonic as well as eudemonic facets, Human Flourishing is presented by Huppert and So as "a combination of feeling good and functioning effectively" [1]. They use "feeling" as a synonym for the hedonic

and "functioning" for the eudemonic aspects of well-being. Their approach is to define Human Flourishing as the mirror opposite of widespread mental illnesses. Depression, anxiety disorder, or combinations of both are the mental disorders with the highest frequency in the general population. Further, they are defined in a way that allows for denomination of their mirror opposites.

They continued their study by identifying questions from the rotation module "Personal and social well-being (section E)" of the European Social Survey (ESS) 2006 [4] that are best suited to cover the said constructs. One question was selected per construct, with such questions that have a long-term connotation in favor over short-termed ones. By testing for the distribution of the respective scores per construct in the general population (based on the ESS dataset), and their correlations, Huppert and So were able to develop an operational definition of Human Flourishing. Flourishing is defined as an individual whose specific threshold values are surpassed for the single item "positive emotion", at least all but one construct from the group "Positive Characteristics", and at least all but one construct from the group "Positive Functioning". It was shown that only "positive emotion" is a construct of hedonic well-being, the other nine measure eudemonic well-being [1].

C. Gamification

Despite earlier use, the term "gamification" did not see widespread adoption before 2010 [12]. Since then it has been used with different scopes and connotations by different parties. An often-cited definition is that of Deterding. It tries to incorporate the different viewpoints and areas of applications by generically subsuming: "Gamification is the use of game design elements in non-game contexts" [12, p. 1]. However, not all agree. Based on their background in service marketing, Huotari and Hamari, for example, state that it depends on the individual perception of a user if a service is gameful, making it impossible for a service designer to identify the non-game context central to Deterding's definition. They specify gamification as "a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation" [13 p. 3] – therefore prioritizing the goal of creating better experiences instead of how to achieve them.

The current discussion also covers the transformational opportunities brought through gamification, namely the positive effects that gamification can foster in crowdsourcing or in collaboratively changing the world for the better [14]. McGonigal proposes to construct games to unlock the engagement and determination inherent in gaming to solve real-world problems. She identifies gamers, while playing to be "super-empowered hopeful individuals" supported by an environment that provides superior abilities for blissful productivity, social fabric, urgent optimism, and epic meaning [15].

Social networks gain importance and are extended by platform features if a gamified application is designed for use within a social network [17]. Besides the social features "leaderboard" (social comparison) and "sweepstakes", social

sharing (“gifting”) gains importance. The incentives “bragging” (notification of one’s social network of achievements) and “inviting” (advertise usage within one’s social) extend the toolbox of gamification methods and serve at the same time as a spreading mechanism for the gamified application [18].

The next discussion point then becomes applying game design elements in an effective way. A commonly shared and expressed finding is the separation of human motivation into intrinsic and extrinsic components, with current gamification approaches to a large extent (only) supporting the latter one. Siegel therefore suggests taking special care to create a plausible, linked, and in difficulty increasing system of leveling in gamified applications. “Leveling” thereby refers to the progress a user makes in discovering the possibilities of an application. He states that ideally several pathways, tailored to varying personal interests, should guide the user in exploring more comprehensive features [17]. Antin and Churchill argue that motivation and social engagement are not automatically supported by using badges: They posit a dependency from the activities that badges are to award and from context. They discern the five functions – goal setting, instruction, reputation, status/affirmation, and group identification – stating that “the fun and interest of goal seeking is often the primary reward itself” [5, p. 2] and that the (wrong) usage of badges could even reduce a user’s intrinsic motivation.

The possible reduction of intrinsic motivation by deploying extrinsic motivators is also described by Deterding who hints on the dependence from social situation or context. He argues that supporting a leaderboard with cash incentives counters a user’s autonomy and thereby intrinsic motivation [6]. Further context sensitivity is brought in by Dixon who presents several models for Player Types – each with differing core motivations for playing – and who states that gender and age are an influence to playing motivations and behavior [8]. A possible solution besides “personalizing” the respective system through detection of a user’s personal type, Vassileva suggests letting the users choose their preferred goals within the gamified application according to prior intrinsic motivation. This can include showing different (or “exaggerated”) data according to the choice. The common separation of human motivation in an intrinsic and extrinsic component is extended by a social one. Two elsewhere in literature not often seen incentives are illustrated: social comparison and community collaboration and quests as a form of challenge that can be resolved by cooperation amongst users, occasionally including time limits [7].

D. BeWell: A game of you on Facebook

For bringing together the research subjects of well-being and gamification, “BeWell: A game of you on Facebook” was proposed [2]. With a focus on community management, a method is presented to calculate individual human flourishing scores (HFS) based on Huppert and So’s definition of Human Flourishing [1]. Building on this, BeWell’s key aspect is to repeatedly calculate a user’s HFS. Here, gamification comes in: BeWell seeks to encourage users to provide data necessary for

the calculation by applying gamification methods to a Facebook application [2]. Being a web application, BeWell additionally takes advantage of cost-efficient and real-time data collection and analysis, amongst other things. As stated earlier, the observation of significant drops in well-being can be considered to demand reaction from community managers [2,3].

III. IMPLEMENTATION

To implement BeWell POC, and address the question of gamification in the acquisition of well-being data, we created a Facebook application.¹ Figure 1 show its basic architecture and core components, which are described below. In our approach, all data is acquired through the user answering questions. The **Question Engine** therefore provides the ability to define arbitrary questions for the measurement of well-being. Questions have three types: 1) a Likert scale question: a question text with a slider; 2) free text question; 3) an animated scale: a pictographic implementation of a Likert scale. Similarly, questions fall into the different categories to fulfill different purposes: 1) Human Flourishing: calculation of well-being, 2) the Big Five Inventory: the normalization of the psychological self [20]; 3) the Maximizer Scale [19]; and 4) placebo questions.

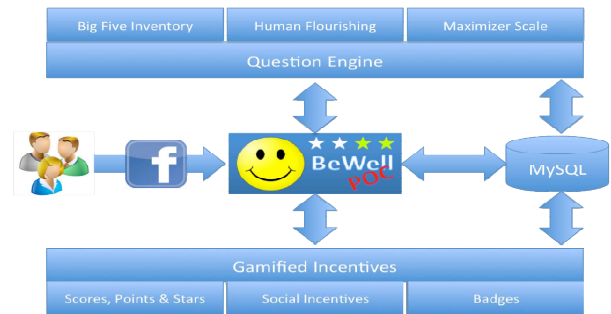


Figure 1: BeWell POC Architecture

Game Engine: BeWell POC requires some logic to ensure a smooth data capture process, and to minimize inaccurate data entry. Therefore, users may only answer questions every 8 hours, and in each time period only up to 10 questions in order to discourage random clicking. Each time period presents users with randomly drawn questions from the question engine.

Gamified Incentives are anchors and features that emerge over time in an attempt to hold the interest of the user, and encourage them to continue answering questions. We implemented three types of incentive: 1) Scores, Points, and Stars; 2) Social Incentives; and 3) Badges, which are explained below.

Scores, Points and Stars: A key part of the BeWell POC is the human flourishing score, and allowing the user to track this information, observe how it changes over time and break down

¹ Available here: https://apps.facebook.com/bewell_poc/

its individual components should capture their interest. We present the user with their human flourishing score graphically (see Figure 2 for an example). The graph requires 3 rounds of questions to be completed before enough data is available to plot the human flourishing score (the red line in Figure 2). Points are earned by completing tasks in BeWell POC, where the primary tasks are answering questions, and inviting Facebook friends to take part. Points enable a user to unlock the human flourishing graph (Figure 2), extend it with additional constructs, and purchase badges. Experience Stars (see the BeWell logo in Figure 1), are earned when a user achieves something, e.g. completes a round of questions, invites friends, unlocks the human flourishing graph, buys a badge etc. Experience stars become more embellished with progress, and are always visible.

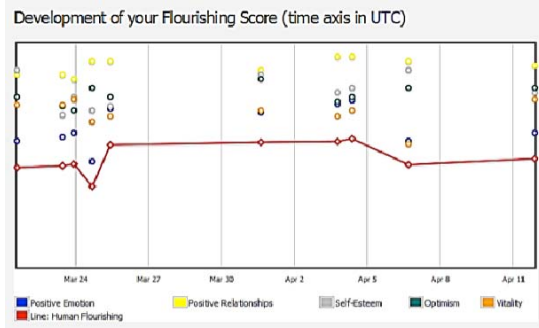


Figure 2: Example human flourishing score Graphic

Social Incentives are constructs that promote social comparison on how well players are progressing, but not on their individual well-being. This is encapsulated by the display of stars, and badges earned by other players in a user's network. Users may also send points to their friends, brag about the purchase of items via status posts, and invite other friends to take part.

Badges follow the basic principle of trophies that display how far a user has advanced. They can only be acquired using points earned from answering questions or inviting friends. They are incremental (i.e. they can only be purchased in order), and increase in cost. In total, 10 badges were available (see Figure 3) and ranged in price from 50 – 500 points.



Figure 3: Badges available in BeWell POC

IV. EVALUATION

BeWell POC ran its test phase on Facebook for the period of one month. The game was propagated through the authors' personal networks, and advertised on Facebook via university department websites. The game was offered in both English and German. As in [2], participation rates are seen as a proxy for the willingness of users to engage in well-being tracking in an online,

setting. An additional evaluation of user satisfaction was conducted with a questionnaire built with the Question Engine.

A. Gender and Residency

From the 121 individuals who navigated to the landing page, 37 self-reported to be female and 82 reported to be male. Two individuals did not disclose their gender. 102 users reported their country of residence to be Germany; eight reported other European countries; and 11 users are outside of Europe (with seven from the United States being the largest sub-group).

B. Tracking Flourishing

Figure 4 depicts the distribution of the users' HFS where $n=63$, the mean is 44.34, and the standard deviation is 17.44. The distribution resembles that one presented by Hall et al. [2], with a relative left-shift of around 10%. This could be plausibly explained through the fact that BeWell POC's population is more European. Europeans were found to have lower average Flourishing Scores than North Americans [2].

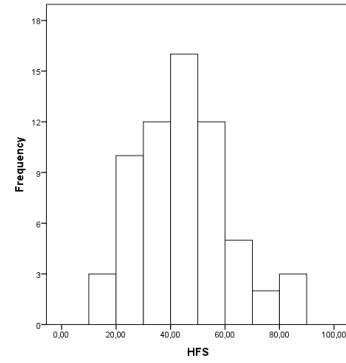


Figure 4: HFS Histogram

Our analysis also replicates the findings of [3, 21], namely that neuroticism and extroversion are the two most fundamental predictors of happiness from an individual's baseline personality (Table 2). Here we found correlations significant at the 1% level corresponding to Extraversion [$r(61) = .32, p = .01$] and Neuroticism [$r(61) = -.39, p = .001$]. This means that higher levels of Human Flourishing are related to high degrees of extraversion and low degrees of neuroticism. Conscientiousness is also highly significant [$r(61) = .33, p = .007$]. The dependencies of the remaining two Big Five Inventory personality traits to HFS were clearly insignificant. However, this analysis also found that men self-report higher flourishing scores (Table 3), which contradicts previous work [3]. Due to the overall low participation rate of women, this could be an exceptional case. The strength of the deviation is in all cases an interesting finding (Figure 5). An additional search for explanatory factors regarding higher standard deviations in the development of human flourishing scores was performed. Based on demographics, usage activity, and psychological tests we found no statistically significant explanatory factor. This is a mixed result requiring further research.

Correlations				
Spearman's rho	HFS	Correlation Coefficient	1,000	,324 ^{**}
		Sig. (2-tailed)	.	,010
		N	63	63
	BFI_Extra	Correlation Coefficient	,324 ^{**}	1,000
		Sig. (2-tailed)	,010	.
		N	63	73
	BFI_Neuro	Correlation Coefficient	-,393 ^{**}	,013
		Sig. (2-tailed)	,001	,913
		N	63	73

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2: Spearman's rho correlations of human flourishing scores, neuroticism, and extraversion levels

HFS			
Gender	Mean	N	Std. Deviation
male	46.0645	40	16.52241
female	40.8929	22	19.24093
Total	44.2294	62	17.55587

Table 3: Mean comparison across genders

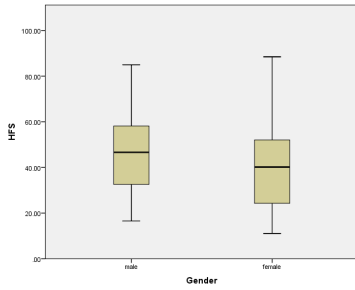


Figure 5: Human flourishing comparison by gender

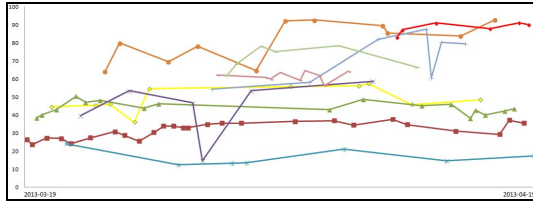


Figure 6: Human flourishing scores of active users

C. Questions on flourishing and gamification

To investigate the irregularities mentioned above further, the HFS were additionally analyzed for other possible explanatory factors using Spearman's rho. There are additional correlations significant at the 5% level regarding some questionnaires items. The higher the HFS, the more a user likes "The Point System" [$r(28) = .39, p = .034$], "Calculation of my human flourishing score" [$r(27) = .44, p = .016$], and "Charting of my human flourishing score's development" [$r(28) = .41, p = .025$]. A higher HFS further correlates to less liking of "Posting Badges to my Facebook timeline" [$r(28) = .40, p = .028$].

Remarkable is the high number of significant correlations found between the Big Five Inventory Test's personality trait "Neuroticism" and the incentives. A highly significant negative correlation with neuroticism can be seen for the items "Getting Experience Stars" [$r(29) = -.59, p = .0005$], "Getting Badges" [$r(31) = -.56, p = .0008$], "The Point System" [$r(29) = -.47, p = .008$], and "Comparing my Badges to those of my friends" [$r(29) = -.46, p = .01$]. A negative correlation with neuroticism still significant at the 5% level can be seen for the items "Comparing my Experience Stars to those of my friends" [$r(28) = -.41, p = .024$] and "Inviting friends" [$r(30) = -.35, p = .049$]. As the scale used in this part of the questionnaire implies that an item is more liked the higher its value, a negative correlation means: The more neuroticism users show, the more likely they are to dislike these specific incentives.

V. DISCUSSION

The aim of this this paper was to extend the work of [2,3] by collecting near to real-time data in a longitudinal rather than cross-sectional manner. The findings indicate that while there is still some work to be completed on the incentive mechanisms, this goal is in fact achievable. This launch is encouraging and will lead to experimental studies on larger scales. The results are in line with those of [3], making it clear that BeWell POC can elicit individuals' well-being information and track changes. Further, the results are in line with current studies in psychology on well-being and psychological profiles [3, 21], which indicates realistic self-reporting.

Looking at the gamification incentives, one can see that the primary interest of the users was to calculate and track their HFS, and to investigate their Flourishing constructs. They predominantly seem to have liked the gameful approach that was taken.. Badges and Experience Stars were of lower importance, but still liked. This is not true for the bragging feature (posting of Badges to one's Facebook timeline) which was clearly unused. The social incentives built into BeWell POC were also underutilized, supporting the view that the users were rather self-contained. Not surprisingly, however, the valuation of the possibility to compare Badges and Experience Stars to friends, as well as to see who is also a user of BeWell POC, is dependent on the actual number of friends playing. This is also an indicator that supports the plausibility of the users' responses regarding the questionnaire. There is an observable rejection of comparative and evaluative incentives through users with higher neuroticism. Our findings also reveal interesting discrepancies with previous work; namely, that conscientiousness is in fact a significant baseline personality factor, and that there could be a difference in the overall happiness of women and men, other than what is currently reported. These findings will be answered with additional iterations of BeWell, using a larger participant pool.

VI. FUTURE WORK AND LIMITATIONS

BeWell POC collected additional data that has not been detailed in this work. Examples include analyzing of additional

usage tracking data and testing for possible significant correlations between the placebo and ten Flourishing Questions. General next steps are to integrate the findings presented in the above section into new versions of BeWell. A serendipitous finding is the valuable service that the notifications feature provided. User reaction was clearly tracked and reported, and some users became “chart unlockers” and long-term players as a direct result. The feature was implemented quite rudimentarily: exactly one notification attempt after three days of inactivity, and after a holiday. Future versions should build on that in a more elaborate way, e.g. by providing user-customizable notifications (email is also a possible channel) with a sensibly preset interval.

Regarding incentives, improvements are possible. For active users, a new version could relax the prerequisite to bring up all ten Human Flourishing related questions per round. Instead, the time frame considered for the calculation of the current HFS could be extended and span answers from different rounds. This way, e.g. five flourishing-related questions could be generated per round if the last round is not too long ago. With gamification now shown to be functional, it would be possible to push the rather limited question bank further, moving into the direction of a “Game Engine” for different sorts and complexities of tasks. The bragging feature was left unused. There is no reason to keep it in future versions. A method to opt-out from comparative and evaluative incentives is also required, as many users disliked them. One could imagine a setting that to hiding the respective links in the tab “Store”; disabling the assignment of Experience Stars; and disabling display of badges and Experience Stars.

VII. CONCLUSION

This work intends addresses the question ‘Can gamification structures be applied to a survey application for measurement of Human Flourishing that yields both continued participation and truthful self-reporting’ by producing a versatile proof of concept implementation as a Facebook application. To address how well different gamification structures incentivized continued usage, a questionnaire that was built into BeWell POC and activated after the completion of data collection. This was demographic user data, the results of psychological tests built into BeWell POC, and usage tracking logs to compare user answers to their actual usage of the application. It was shown that gamification can be successfully applied to measure Human Flourishing – motivating users to continuously employ the artifact while providing truthful data. However, analysis did also reveal limitations of BeWell POC, in conflicting results for some incentives.

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