

Low-Cost Gamification of Online Surveys: Improving the User Experience through Achievement Badges

Johannes Harms, Dominik Seitz, Christoph Wimmer, Karin Kappel, Thomas Grechenig
INSO Research Group, Vienna University of Technology, Austria
Firstname.Lastname [at] inso.tuwien.ac.at

ABSTRACT

Gamification of online surveys has been shown to be effective for improving user experience and data quality. However, the precise effects of isolated game elements is unknown and survey gamification requires a lot of effort. This work proposes the use of just a single game element as a novel low-cost approach. It presents evaluation results from a case study where an existing survey was gamified using the popular game element of achievement badges. Results show that the badges improved the user experience but did not influence the respondents' behavior. These benefits are similar to related work but have been achieved with a lower effort. In summary, the case study indicates our low-cost approach to be viable and efficient for survey gamification, and achievement badges to be well-suited for gamified online surveys.

Author Keywords

Gamification; Online Surveys; Low-Cost Method; ROI; Game Achievement Badges.

ACM Classification Keywords

H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous; K.8.0 Personal Computing: Games.

INTRODUCTION

Gamification of online surveys has been employed for improving user experience by affording gameful, playful, 'fun' interactions; and data quality by improving respondent behavior. These are important goals because online surveys have been criticized for being dull and unengaging, resulting in negative respondent behavior (such as speeding, random responding, lack of attention, empty, conflicting, or straight-lined answers, and premature termination [6, 14, 15]). In contrast to these negative outcomes, evaluations of gamified surveys have reported diverse psychological and behavioral benefits regarding user experience, motivation, participation, amount and quality of data [2, 5, 6]. This work addresses two problems within the context of gamified online surveys. Firstly, the benefits of individual game elements are unclear

to date. Prior work has evaluated combinations of multiple game elements; this study evaluates a single game element (i.e., the popular element of achievement badges) in isolation. Secondly, survey gamification requires a lot of effort. This work examines the use of just one game element as a low-cost method. Methodologically, an existing online survey about sports and leisure activities of teenagers and young adults was gamified using within-survey badges awarded for user achievements, see Figures 1 and 3. This paper contributes results from an evaluation with 139 participants.

RELATED WORK

Gamification has been defined as "the use of game design elements in non-game contexts" [4]. The non-game context investigated in this work is online surveys. Outcomes of gamification have been described in terms of game elements serving as motivational affordances, which produce psychological and behavioral effects [8]. These outcomes depend on a-priori factors, such as user characteristics, affect, tasks, and usage context; as shown in Figure 2. Beneficial outcomes of gamified online surveys have included increased motivation [2], better user experience [6, 16], and increased data quality [16]. Nevertheless, survey gamification has not always reached its goals. E.g., one study (despite improving the user experience) failed to produce the hoped-for improvements in engagement and data quality [6]; another study reported a lower response rate [9].



Figure 1. The gamified survey showed awarded badges and challenged to complete further, yet unachieved (hence grayed-out) badges.

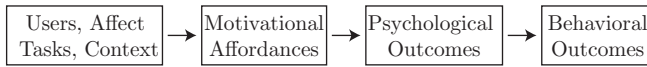


Figure 2. Effects of gamification: Game elements in a non-game context [4] provide motivational affordances that produce psychological and behavioral outcomes [8], depending on a-priori factors including user characteristics, affect, tasks, and context. Figure from [9].

Gamified survey designs have varied greatly in related work, ranging from simple decorations to highly interactive, game-like applications. Some of the more ambitious designs have achieved better results, but also required a lot more time and effort. In one study, a “full game” survey design produced higher motivation compared to “partial game” and conventional designs, but the study did not report the invested amount of effort [2]. In another study, simple decorations did not improve outcomes whereas more advanced “functionally visual” or “fully gamified” designs produced a better user experience – but required more than twice the amount of working hours, plus additional costs for subcontracted artwork [6]. A third study reported over 200 working hours invested into a highly gamified, almost game-like survey, compare Table 1. The primary outcomes were an improved user experience (more perceived fun, higher willingness to use and recommend the survey) but a lower response rate [9].

Return-on-Investment (ROI) is well-suited for investigating the ambivalence between outcome and effort of survey gamifications. The ROI of gamification projects can be measured as the effect of gamification on key performance indicators (KPIs), put in relation to the cost or effort invested into gamification [3]. With regard to online surveys, KPIs translate to beneficial psychological and behavioral outcomes. ROI can be improved by two strategies: firstly by improving outcomes, and secondly by reducing or re-using efforts. Given that the first strategy has already been examined in prior studies’ ambitious and laborious designs, the second strategy is of primary interest for this work. Within this direction, low-cost or ‘discount’ methods promise to produce good results without requiring a lot of effort. Despite their potential for increasing ROI, low-cost approaches to gamification have been subject to harsh criticism. For example, Werbach and Hunter warn about “the lure of pointsification” [19]. Pointsification describes the approach of mindlessly using features least essential to games (e.g., points) in non-game contexts [17]. Jacobs likewise proposes to understand gamification not as simple ‘addition’ of game elements, but as a complex task that requires a “holistic process” [13]. We agree with the above warnings and recommendations and carefully employed the design process for survey gamification from [10] in this work, but we also stress the importance of keeping efforts low.

Achievements are a common design pattern in gamification [7, 19], consisting of a signifier (often visualized as a badge that displays name and description of the achievement), completion logic, and rewards [7]. They fulfill five social and psychological functions [1]: setting goals for users, instructing about possible further activities, visualizing past activity, providing status symbols, and supporting group identification. The first three functions are apt for single-user experiences, as typically intended for survey filling. In con-



Figure 3. Achievement badges designed for the gamified survey.

trast, the other two functions are based on social interactions; they are therefore less suited during survey filling, but may be employed before and after a survey to motivate members of a survey panel. Despite the general popularity of badges in gamification [7, 19], their effect in the specific domain of gamified online surveys has not yet been evaluated.

CASE STUDY: SPORTS SURVEY

An existing, publicly available online survey about sports and leisure activities among teenagers and young adults¹ was chosen as a case study because of the following, beneficial characteristics: The survey’s questions are easy to understand; therefore domain-specific knowledge amongst participants is unlikely to bias evaluation results. Furthermore, recent work has gamified the same survey using an ambitious, labor-intensive, design [9], so it is interesting to see how these results compare to our low-cost approach.

Design Process: Two designers (one senior designer with more than 7 years experience in HCI and one HCI master student) employed the design process for survey gamification put forth by Harms [10] to gamify the sports survey. They chose target aesthetics of challenge, collection, and possession because they hoped that challenges would motivate users to engage in the survey, and considered collection and possession of badges to be suitable rewards. They used Hamari’s framework [7] to design a small set of 10 meaningful achievement badges, see Figure 3, aiming to encourage positive behavior without motivating biased answers. Each achievement consisted of a badge serving as signifier (designed to fit the survey’s sports theme), a completion logic, and, as reward, possession of the badge in a collection of personal achievements. The achievement badges were evaluated through formative usability testing and improved in two subsequent design iterations. The collection of badges was placed in the topmost part of the screen, as shown in Figure 1. It visualized both past achievements (i.e., completed badges) and new challenges (further badges yet to be achieved, shown in a grayed-out visual style). The completion logic of an achievement was displayed when the user moved the mouse cursor above the badge. The total effort invested into the gamification was 68 working hours, see Table 1. Much of this effort

¹<http://jugendportal.at/befragung/bewegung-und-sport>, April 3rd, 2015.

Effort (hours)	This paper	Σ	Prior work [9]	Σ
Conventional Survey	Installation:	4	Design:	1
	Implementation:	8	Implementation:	4
	Testing:	4	Testing:	1
		16		6
Re-usable Gamification	Design:	14	–	–
	Implementation:	28		
	Testing:	6	48	
Survey-specific Gamification	Concept:	4	Design:	57
	Visual Design:	16	Implementation:	83
			Testing:	107
				247

Table 1. Working hours for the conventional survey and its gamification, compared between this paper and prior work [9].

can be re-used to gamify other surveys since only the visual design of the badges (20 hours) was specific to the sports survey. Note that installation activities did not include conceptualizing text-only questions because they were adopted from an existing survey. We did not outsource any activities.

Study Design and Test Procedure: The gamified survey was evaluated in a remote, comparative, between-subject usability test. Invitations were sent to teenagers and young adults (14 - 26 year old) via Email and Facebook, and potentially forwarded. We did not promise any extrinsic rewards and did not disclose the goal of evaluating a gamified design. Respondents filled a pre-test questionnaire, were randomly assigned to the gamified or conventional sports survey, and then completed a post-test questionnaire. The survey was stopped when participation ceased after two weeks. We measured *psychological* outcomes of gamification (affect, user experience, and ratings of fun, duration, and preference) as well as *behavioral* outcomes (completion, duration, speeding, straightlining, and answers given). The significance of observed differences was tested using non-parametric tests, more specifically, an Exact-Methods implementation of the Mann-Whitney U-test. This method is well-suited for the lack of normality and the heteroscedasticity present in much of the data. Differences in dichotomous data were tested using Chi-Square tests. The significance level of all tests was $p < 0.05$.

RESULTS

Among the 139 persons who clicked the invitation link, 126 participants completed the pre-test questionnaire and were randomly assigned to either the gamified (N=66 participants) or conventional (N=60) sports survey. See Table 3 for a summary of the participants' demographic characteristics.

Affect: The participant's affect before and after filling the survey was measured using I-PANAS-SF [18] questions in the pre- and post-test questionnaires. Affect scores ranged from 0 to 50, the higher the stronger the emotion. Differential affect scores were calculated as post-test minus pre-test scores. None of the scores differed significantly depending on survey design, see Table 2a.

User Experience: AttrakDiff2 [11] questions in the post-test questionnaire allowed to assess four qualities of user experience, see Table 2b. The "pragmatic quality" and "hedonic quality - identity" scores were insignificantly different between the gamified and conventional survey. In contrast, the

scores for "hedonic quality - stimulation" and "attractiveness" were significantly higher (i.e., better) in the gamified survey.

Subjective Ratings: The post-test questionnaire included three Likert-type questions where participants rated fun ("The survey was fun"), perceived duration ("The survey took a lot of time"), and subjective preference ("I liked the survey better than other surveys"). The available answers were coded as "strongly disagree" (1), "disagree" (2), "agree" (3) and "strongly agree" (4). Evaluation results (Table 2c) show no significant differences regarding the first two questions, but preference was higher (better) in the gamified survey.

Respondent Behavior: The gamified survey's completion rate of 86% (N=57 out of 66) was only insignificantly higher than the conventional survey's completion rate of 83% (N=50 out of 60), see Table 2d.

The time that participants spent on the survey and the number of words they answered in response to free-text questions provided additional measures of engagement. Results showed no significant difference between the two survey designs, see Table 2d. Respondents of the gamified survey collected an average of 7.04 badges (N=57, M=7.04, SD=1.636).

Speeding, straightlining, and empty answers are measures of negative respondent behavior [10] that may be explained in terms of "satisficing" [14, 15]. Speeding was measured in a similar way to [20]. A threshold of 200 ms multiplied by the number of words in each survey page was set, allowing to count the number of pages where a participant was faster than the speeding threshold. Straightlining was assessed by counting the number of question groups with only identical answers. We also counted the number of questions with empty answers. None of the measures significantly differed between the gamified and conventional survey, see Table 2d.

We investigated the influence of gamification on the answers given by respondents using separate tests for each individual survey question (Mann-Whitney U-tests for ordinal questions, Chi-Square tests for boolean questions, Dunn-Sidak adjusted p-Values). None of the questions revealed a significant influence, the smallest adjusted p-Value being $p=0.861$.

Qualitative Feedback: The post-test questionnaire included three plain-text questions: "What did you like about the survey", "What didn't you like?", and "What would you change or improve?". Answers were coded into positive and negative statements made about the gamified and conventional survey, see Table 4. Participants of the gamified survey provided more, and more positive feedback. The majority of comments referred to the achievement badges, and did so in a positive way (22 positive and 4 negative statements). Participants commented, for example, "These badges are a great idea", and "The badges were fun". Among the four negative statements about the badges, one found them to be too pushy and obtrusive, one stated the opposite and suggested more visibility, and the other two negative statements concerned details of specific badges. Other feedback referred to the wording of questions (which we had adopted from the existing sports survey), usability (mostly visual design), and the survey's duration (both positive and negative comments).

Demographic characteristic		Gamified		Convent.	
		N	%	N	%
Gender	Female	27	40.9%	24	40.0%
	Male	36	54.6%	36	60.0%
	N/A	3	4.5%	0	0.0%
Agegroup	≤19	6	10.0%	6	9.1%
	20-29	41	68.3%	46	69.7%
	≥30	8	13.4%	7	10.6%
	N/A	5	8.3%	7	10.6%
“Do you play computer games?”	Yes	51	77.3%	45	75.0%
	No	15	22.7%	15	25.0%
“Are you familiar with game achievement badges?”	Yes	41	62.1%	38	63.3%
	No	25	37.9%	22	36.7%

Table 3. Demographic characteristics of the participants.

Code	Gamified		Conventional	
	Pos	Neg	Pos	Neg
Achievement Badges	22	4	n/a	n/a
Questions and Wording	4	7	15	5
Usability	3	1	3	3
Survey Duration	2	1	2	1

Table 4. Qualitative feedback from the post-test questionnaires.

DISCUSSION AND OUTLOOK

Achievement badges were employed as the one and only game element in a gamified online survey. This allowed to evaluate their effect in isolation from other game elements.

Evaluation results revealed improved psychological outcomes but no behavioral changes. Respondents found the gamified design to be more attractive and stimulating, preferred it over other surveys, and provided positive feedback about the badges. Respondent behavior showed no influence of gamification – as a positive aspect of this result, the gamification did not produce biased answers. In summary, results indicate achievement badges to be suitable and safe to use.

Low-cost Approach: We proposed and evaluated the use of a single game element (achievement badges in our case study) as a low-cost method for survey gamification. The outcome of

improved user experience without behavioral change is similar to related work [9, 2, 6], but was achieved with a lower effort, much of which can be re-used for further surveys (see Table 1), which indicates a higher return on investment (ROI). This supports our hypothesis that using just one game element is a well-suited low-cost method for survey gamification.

Future Work: Practitioners interested in using badges to gamify an online survey may ask if it is worth the effort. The answer depends on how highly they value the monetary worth of the benefits and working hours reported in this paper. Future research may wish to challenge, strengthen, or generalize our results in further contexts using different game elements. It would also be interesting to evaluate long-term panelist behavior across multiple surveys, as well as the viral distribution of invitations. Research may also seek to further increase ROI. This will require more formal measures of ROI to enable comparisons across multiple gamified surveys. One strategy will then be to reduce efforts, e.g., through re-usable implementations and gamification frameworks, compare [12]. Another strategy will be to improve outcomes and investigate how improved user experience can be turned into improved respondent behavior. This could be achieved by re-designing achievement badges or through other game elements.

CONCLUSION

The use of a single game element was investigated as a low-cost method for gamifying online surveys. Specifically, the popular game element of achievement badges was employed and evaluated in a case study. Results show that the gamified survey did not change user behavior, but produced better psychological outcomes (better user experience, higher preference, positive qualitative feedback). These results are similar to related, more laborious studies, but were achieved using a simpler, low-cost approach. In summary, the case study suggests the use of just one game element to be a useful and applicable low-cost approach and achievement badges to be well-suited for increasing the user experience in gamified online surveys.

		N	Gamified		Conventional		Test Statistic	p-Value	
			M	SD	N	M			SD
a) Affect I-PANAS-SF [18]	Pre-Test Positive Affect	58	14.66	3.354	56	14.70	3.264	U=1581.0	0.808
	Pre-Test Negative Affect	60	6.15	1.858	58	6.29	2.392	U=1728.0	0.945
	Post-Test Positive Affect	55	14.42	3.521	47	14.49	3.406	U=1257.0	0.813
	Post-Test Negative Affect	55	5.67	1.001	48	5.73	1.976	U=1163.5	0.220
	Differential Positive Affect	53	-0.45	2.081	44	-0.50	2.029	U=1127.5	0.779
	Differential Negative Affect	55	-0.29	1.133	46	-0.22	0.696	U=1238.5	0.827
b) User Experience AttrakDiff2 [11]	Pragmatic Quality	48	1.38	0.634	42	1.31	0.735	U=948.5	0.851
	Hedonic Quality - Identity	43	0.74	0.721	38	0.72	0.749	U=787.0	0.779
	Hedonic Quality - Stimulation	48	0.90	1.000	41	0.23	0.885	U=536.5	<0.001
	Attractiveness	48	1.43	1.429	41	1.09	0.852	U=746.0	0.049
c) Subjective Ratings 4-item Likert-type questions	Fun	55	2.98	0.828	48	2.83	0.975	U=1233.5	0.545
	Time consuming	56	1.66	0.837	48	1.69	0.689	U=1261.5	0.557
	Preferred over other surveys	53	3.09	0.714	42	2.64	0.958	U=821.5	0.019
d) Respondent Behavior	Completion of the survey	66	0.86	0.346	60	0.83	0.376	$\chi^2(1)=0.229$	0.632
	Time spent in the survey	57	08:04	03:12	50	08:19	04:50	U=1366.0	0.713
	Words in free-text answers	57	19.96	14.874	50	20.24	18.083	U=1268.5	0.724
	Speeding	64	0.58	1.307	59	0.59	0.949	U=1714.5	0.292
	Straightlining	61	0.38	0.553	57	0.26	0.552	U=1535.0	0.182
	Empty Answers	57	2.28	8.474	50	3.16	7.614	U=1134.0	0.057

Table 2. Psychological (a-c) and behavioral (d) outcomes of the gamified survey.

REFERENCES

1. Antin, J., and Churchill, E. F. Badges in social media: A social psychological perspective. In *CHI 2011 Gamification Workshop Proceedings*, (2011).
2. Cechanowicz, J., Gutwin, C., Brownell, B., and Goodfellow, L. Effects of gamification on participation and data quality in a real-world market research domain. In *Gamification 2013: Proc. First Int. Conf. Gameful Design, Research, and Applications*, ACM (2013), 66–73.
3. Conley, K., and Donaldson, C. Gamification: The measurement of benefits. In *Gamification in Education and Business*, T. Reiners and L. C. Wood, Eds. Springer, 2015, 673–688.
4. Deterding, S., Dixon, D., Khaled, R., and Nacke, L. From game design elements to gamefulness: Defining “gamification”. In *Proc. 15th Int. Academic MindTrek Conference: Envisioning Future Media Environments*, MindTrek '11, ACM (2011), 9–15.
5. Dolnicar, S., Grün, B., and Yanamandram, V. Dynamic, interactive survey questions can increase survey data quality. *J. Travel & Tourism Marketing* 30, 7 (2013), 690–699.
6. Downes - Le Guin, T., Baker, R., Mechling, J., and Ruyle, E. Myths and realities of respondent engagement in online surveys. *Int. J. Market Research* 54, 5 (2012), 1–21.
7. Hamari, J., and Eranti, V. Framework for designing and evaluating game achievements. *Proc. DiGRA 2011: Think Design Play 115* (2011), 122–134.
8. Hamari, J., Koivisto, J., and Sarsa, H. Does gamification work?—a literature review of empirical studies on gamification. In *Proc. 47th Int. Conf. System Sciences*, HICSS, IEEE (2014), 3025–3034.
9. Harms, J., Biegler, S., Wimmer, C., Kappel, K., and Grechenig, T. Gamification of online surveys: Design process, case study, and evaluation. In *Proc. 15th IFIP TC 13 Int. Conf. Human-Computer Interaction, INTERACT 2015*, J. Abascal, S. D. J. Barbosa, M. Fetter, T. Gross, P. Palanque, and M. Winckler, Eds., vol. 9296 of *Lecture Notes in Computer Science*. Springer (2015), 214–231.
10. Harms, J., Wimmer, C., Kappel, K., and Grechenig, T. Gamification of online surveys: conceptual foundations and a design process based on the MDA framework. In *Proc. 8th Nordic Conf. Human-Computer Interaction: Fun, Fast, Foundational*, ACM (2014), 565–568.
11. Hassenzahl, M., Burmester, M., and Koller, F. Attrakdiff: Ein Fragebogen zur Messung wahrgenommener hedonischer und pragmatischer Qualität. In *Mensch & Computer 2003*, G. Szwillus and J. Ziegler, Eds., vol. 57 of *Berichte des German Chapter of the ACM*. Vieweg+Teubner Verlag, 2003, 187–196.
12. Herzig, P., Ameling, M., Wolf, B., and Schill, A. Implementing gamification: Requirements and gamification platforms. In *Gamification in Education and Business*, T. Reiners and L. C. Wood, Eds. Springer, 2015, 431–450.
13. Jacobs, M. Gamification: Moving from ‘addition’ to ‘creation’. In *CHI 2013 Workshop Designing Gamification: Creating Gameful and Playful Experiences*, ACM (2013).
14. Kaminska, O., McCutcheon, A. L., and Billiet, J. Satisficing among reluctant respondents in a cross-national context. *Public Opinion Quarterly* 74, 5 (2010), 956–984.
15. Krosnick, J. A. Response strategies for coping with the cognitive demands of attitude measures in surveys. *Applied Cognitive Psychology* 5, 3 (1991), 213–236.
16. Puleston, J. Gamification of market research. In *Social Media, Sociality, and Survey Research*, C. A. Hill, E. Dean, and J. Murphy, Eds. Wiley, 2014, 253–293.
17. Robertson, M. Can’t play, won’t play, October 2010. Retrieved June 6, 2015 from <http://www.hideandseek.net/2010/10/06/cant-play-wont-play/>.
18. Thompson, E. R. Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *J. Cross-Cultural Psychology* 38, 2 (2007), 227–242.
19. Werbach, K., and Hunter, D. *For the Win: How Game Thinking Can Revolutionize Your Business*. Wharton Digital Press, 2012.
20. Zhang, C., and Conrad, F. Speeding in web surveys: The tendency to answer very fast and its association with straightlining. In *Survey Research Methods*, vol. 8 (2014), 127–135.