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Repositorium für die Medienwissenschaft

DFG Deutsche Forschungsgemeinschaft

Philipps Universität Marburg

Badging the Teacher

An Experimental Study about Gamification Effects on a Sharing Platform for Educational Resources

Abstract: Despite increasing needs for shared educational resources, only few users of digital sharing platforms such as Lehrermarktplatz.de (LMP) frequently upload own material. The implementation of gamification elements may increase users' engagement and motivation to share. In this paper, we discuss the effects of a digital badge system on LMP. With the help of user tracking (N = 2083) and an online survey (n = 150), only few minor differences were detected between experimental (badge system) and control group (no badge system) regarding user engagement. There were no significant differences in motivations to share. Participants stated manifold reasons for sharing, especially intrinsic motivations and monetarisation, and have mixed opinions about the badge system and its usefulness as external motivator. This calls for a stronger focus on individual user differences.

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1. Introduction

In the current situation of a global pandemic, home schooling became the *way to go* for teachers and students in many parts of the world. More than ever, collaboration and solidarity between but also within the two groups are a crucial factor of fruitful educational processes. Here, online platforms offer useful possibilities for exchanging experience as well as teaching and learning resources. The rise of a platform-based sharing culture in general has been an ongoing trend in recent years, though only a small fraction of users is willing to publicly share their own (intellectual) property.[1]

One way to increase the willingness of people to actively contribute is to gamify a service, e.g., by implementing levels, badges, or competitive mechanisms.[2] As systematic literature reviews have shown, gamification has mainly positive effects on user engagement and motivation.[3] Therefore, gamification is often used in the e-learning market, e.g., for in-house training, such as the SAP Community Network (with ranking lists and a score system). So far, platform providers and research mainly focus on the learner´s point of view. Teachers as a target group only come *into play* if they use gamification in class, or if they use professional training programmes and become learners themselves.[4] Here, processes can be gamified in order to boost engagement.

The German sharing platform for teaching resources Lehrermarktplatz.de (LMP) has changed this by implementing a badge system[5] to award certain activities of those who share material on their website. This paper presents results of a mixed-method experimental study including user tracking ($N = 2083$) and a user survey ($n = 150$) that examined the effects of the new gamification elements of LMP on (a) user engagement and (b) user motivation to share own teaching material. After briefly introducing LMP, we will summarise the state of research regarding the sharing economy, gamification (using the Self-Determination Theory[6] as theoretical framework) as well as teachers as platform users. Next, we will describe the methods used in this study and present important findings. In a subsequent discussion, limitations and implications for future research and practice will be given.

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[1]   TNS Emnid 2015: 8.
[2]   Cf. Zichermann/Cunningham 2011.
[3]   Cf. Hamari/Koivisto/Sarsa 2014, Alsawaier 2018, Hallifax et al. 2019.
[4]   E.g. Dyjur/Lindstrom 2017.
[5]   In the following, the terms "badge" and "trophy" will be used synonymously.
[6]   Cf. Ryan/Deci 2000.

## 2.   The Gamified Sharing Platform LMP

LMP is a German online platform for sharing educational resources. The platform is free to use, but offered material can be sold on a commission basis – which is how LMP generates its profits. LMP's marketing goal is to provide a wide range of high-quality teaching material. However, the platform does not cover all topics yet, especially in minor subjects. The so-called *authors* decide whether they want to share their material for free or which price they want to set. Since its launch in 2016, LMP has become one of the biggest German platforms for teaching material and currently comprises more than 84,000 materials and 440,000 active users, of which only approx. 3700 (< 1%) contribute material themselves.[7] This imbalance uncovers unused synergies: it is likely that more teachers could share self-made material, from which other teachers and LMP could benefit. Therefore, LMP offers new users *rewards* in the form of physical goods that have a clear monetary value, e.g., for uploading their first material or several materials in a certain time period. These goods can be school planners, gadgets, LMP merchandise, vouchers etc. However, most sales are still generated by a small *bestseller* group. Most and especially new authors rarely use actions to promote own material to increase download numbers. This is what LMP aims to address.

In the summer of 2019, the LMP team decided to use gamification to promote existing authors' engagement and motivation to share by implementing a digital badge system. In contrast to the physical rewards, badges are digital goods that cannot be monetised. The investigated badges, which are visible in a user´s personal trophy list, but greyed out until earned, are considered *onboarding* badges for authors. Trigger actions comprise promotional actions that were rarely used by *young* authors so far, such as uploading a profile picture or creating a voucher (see Tab. 1).

This paper's first author accompanied LMP´s gamification concept, design, and implementation. The paper is based on her bachelor thesis[8], in which she was advised by the second author.

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[7]   Source: Internal user statistics in August 2020. Probably due to the COVID-19 pandemic, the number of users as well as uploaded documents have vastly increased since the period of investigation in November 2019 (50,000 documents; 220,000 users). The user-author ratio stayed roughly the same (2100 authors in 2019).

[8]   Lüpkes 2019.

Badge Title	Visual	Trigger
"Augenweide" (eye candy)		Change profile picture and background image
"Offenes Buch" (open book)		Change description text in profile
"Goldene Feder" (golden feather)		Write blog article
"Spendierhose" (being generous)		Generate voucher
"Sparfuchs" (saving money)		Place material in sale
"Erfrischung" (refreshment)		Update material and notify customers
"Ping-Pong" (ping pong)		Reply to feedback on material
"Feuer & Flamme (X)" (on fire)		Upload something in (X) consecutive weeks

Tab. 1: Overview of investigated badges

3. Theory and State of Research

Three areas of research are comprised in this study: the sharing economy, gamification effects, and teachers as a target group. Accordingly in this section, we will provide an overview of the theoretical background and the state of research.

3.1 Sharing Economy

The issue of sustainability, whether ecological or economic, has become increasingly important in recent years. Current literature now frequently refers to a "sharing economy"[9], "peer production"[10], or "collaborative consumption"[11]. Hamari et al. define this trend as the "peer-to-peer-based activity of obtaining, giving, or sharing the access to goods and services, coordinated through community-based online services"[12]. The focus is often on the fact that digital platforms act as mediators of *sharing*. These platforms can be operated by the community itself or by non-profit organisations without any financial interest (e.g., local food-sharing communities). Often, however, they are managed by companies, for example by having contributors sell their material on a commission basis (such as LMP).

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[9]   Cf. Behrendt/Henseling 2019, Hamari/Sjöklint/Ukkonen 2016, Hawlitschek 2019.
[10]   Cf. Aigrain 2012, Bauwens 2016, Hamari/Sjöklint/Ukkonen 2016.
[11]   Cf. Hamari/Sjöklint/Ukkonen 2016.
[12]   Hamari/Sjöklint/Ukkonen 2016: 2047.

Because of the increased commercial and general interest, survey-based research has investigated the motivations for using and contributing to educational sharing platforms. Hylen cited altruism, personal and commercial benefit, and reuse of the material as reasons for sharing resources.[13] Pegler, on the other hand, questioned the effect of different motivations on the probability of sharing one's own material. His results support the statements of Hylen, highlighting the use of synergy effects, and the improvement of exchange, teaching quality, and solidarity.[14] The results of van Acker et al. also show that altruism seems to be more important than the reciprocity of sharing and reputation improvement, although the authors sometimes encountered contradictions in their analysis that they could not further explain due to lack of qualitative data.[15] All three studies refer to environments where all shared material is offered free of charge, unlike LMP, where authors can choose to set their own prices. Regardless of possible monetarisation, we consider LMP as being embedded in the sharing economy, because it is not only a *marketplace* (as its name might suggest) but a community-based peer-to-peer sharing service, where almost all of the providers are also receivers of the negotiated goods.

3.2 Gamification and Its Effects on Engagement and Motivation

According to Deterding et al., gamification denotes "the use of game design elements in non-game contexts"[16]. One of its aims is to influence the behaviour of users by enhancing the value of the gamified system from the users' perspective, e.g., motivating the users to do certain tasks due to playful approaches.[17] Regarding LMP, this includes frequently sharing teaching material as well as promotional activities (Tab. 1). *Badges* or *trophies* are specific game design elements to gamify a service, amongst others such as points, levels, and leader boards.

For more than ten years, gamification has been an important topic of interdisciplinary research. Systematic literature reviews mainly reveal positive gamification effects on user engagement (e.g., session numbers and activities on the platform), and motivation.[18]

According to the psychological Self-Determination Theory (SDT) by Ryan and Deci[19], the type of motivation for an action regulates a person´s sense of self-determination for their behaviour. Motivation can range from amotivation and extrinsic motivation (i.e. doing something because of an external influence, which can have

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13   Cf. Hylen 2007.
14   Cf. Pegler 2012.
15   Cf. van Acker et al. 2013.
16   Deterding et al. 2011: 2.
17   Cf. Stieglitz 2017.
18   Cf. Hamari/Koivisto/Sarsa 2014, Alsawaier 2018.
19   Cf. Ryan/Deci 2000.

different levels[20]) to intrinsic motivation (i.e. "doing an activity for the inherent satisfaction of the activity itself"[21]). The more intrinsic a motivation is, the more a behaviour is perceived as self-determined. That is, because self-determination builds on three criteria, which are referred to as *competence*, *relatedness*, and *autonomy*. While extrinsic motivators can also trigger a certain behaviour, they contradict self-determination. For example, intrinsically motivated people may feel deprived in their competence and autonomy by extrinsic motivators.[22] By giving the option to offer own material for an individually set price, LMP addresses different kinds of motivations. Physical and monetary rewards as well as the newly implemented digital badges can be considered external motivators. The difference between those is that the badge system creates a rewarding feeling only by addressing a user´s playfulness.

The SDT is often used to empirically test the effects of gamification (which is always an external motivator) on user activity[23] and to describe the different types of motivation when it comes to the use of sharing platforms.[24] For example, Hanus and Fox investigated the use of a badge and leader board mechanisms in a classroom and have found negative effects on intrinsic motivation that caused lower exam performances.[25] Another gamification study from 2013 contradicts these results, though, with experience points, levels, leader boards, challenges, and badges having a positive impact on performance and motivation.[26] So far, however, few experimental studies have been conducted to verify the actual causal effect of singular game design elements.[27] Different elements – which may also be used for different reasons (e.g., badges as reward or personalisation[28]) – have different effects[29] and should be considered separately in empirical studies. For example, in Hamari´s 2017 study of a gamified sharing platform, the badge system proved to significantly influence the number of transactions, comments, and page visits.[30]

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[20]   These depend on how strongly a behaviour, regulated by external factors, is internalised. Ryan and Deci (2000) distinguish between external (for external demands or rewards), introjected (to avoid guilt, anxiety, and/or shame), identified (of personal importance, but still external), and integrated (congruent with one´s values and needs) regulation.

[21]   Ryan/Deci 2000: 71.

[22]   Cf. Schmidt-Kraepelin et al. 2019, Chan et al. 2018.

[23]   Cf. Alsawaier 2018, Barata et al. 2013, Hanus/Fox 2015, McDaniel/Fanfarelli 2015.

[24]   Cf. Hamari/Sjöklint/Ukkonen 2016, Liu/Fang 2010.

[25]   Cf. Hanus/Fox 2015.

[26]   Cf. Barata et al. 2013.

[27]   Cf. Antonaci/Klemke/Specht 2019.

[28]   As investigated in Gamrat/Zimmerman 2015.

[29]   Cf. Antonaci/Klemke/Specht 2019.

[30]   Cf. Hamari 2017.

3.3   Teachers as Target Group

In contrast to this research project, previous gamification research mainly focuses on students as users of gamified learning platforms.[31] Studies on badge systems in digital training platforms for teachers, so far, revealed that the majority of users are in favour of digital badges, while some indicate negative perceptions.[32] Although badges were not the only reason to attain the training programme, they served as a motivational element.[33] However, in a similar context compared to our study, Arcos et al. have found teachers to have very mixed opinions about the game elements, possibly because the implemented points system was perceived as a restrictive element.[34] The LMP badge system, in contrast, does not have such restrictive effects.

4.   Research Question

Despite the increasing need of sharing educational resources, only few users of digital sharing platforms such as LMP frequently provide and promote own material.[35] The implementation of digital badges may help to increase authors' engagement and motivation to share. But while previous research mainly reveals positive gamification effects on learners, effects on teachers' user engagement are less frequently studied, with inconclusive results.

Having the SDT in mind, we study authors' engagement (here: general frequency of usage, upload frequency and badge trigger actions) with the platform as well as their motivation. The aim of this study is to provide answers to the following research question:

RQ: *Which effects does the use of a badge system implemented in a digital sharing platform for teachers have on (a) user engagement and (b) motivation to share?*

5.   Methods and Data

5.1   Data Collection and Design

In order to answer our research question, a mix of methods was applied, consisting of (1) user tracking data ($N = 2083$) and (2) an online survey ($n = 150$), each comparing an experimental E (with access to trophies) with a control group C (without access

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[31]   Cf. Hamari/Koivisto/Sarsa 2014, Alsawaier 2018.
[32]   Cf. Dyjur/Lindstrom 2017, Jones et al. 2018.
[33]   Cf. Dyjur/Lindstrom 2017.
[34]   Cf. de los Arcos et al. 2017, where the points system regulated a user´s balance of *give and take*.
[35]   TNS Emnid 2015: 8, LMP user data.

to trophies). In strict compliance with data protection, the user data was tracked by an employee of the platform who forwarded the anonymised data to the researchers.

(1) All users who had uploaded at least one material at any time before the test-launch of the badge system (on 12/09/2019) were observed for 25 days before and after the launch.[36] Other users were not included, because the badge system was only aimed at LMP authors. Thus, the data covered the complete population of active authors of the sharing platform (N_E = 1056; N_C = 1027).

(2) To evaluate the acceptance of the trophy system and to investigate its dependence on motivation reasons, an online questionnaire was developed. After the period of data tracking, LMP e-mailed the invitation to the survey to all study participants. Again, the researchers received anonymised data for the experimental (n_E = 85) and control group (n_C = 65).

5.2   Operationalisation

(1) User engagement was tracked by the number of days with at least one session and completed badge trigger actions (see Tab. 1). For each promotional action, a separate sample was calculated excluding those who already had fulfilled a trophy's condition before the launch.

(2) Within the survey, respondents' self-assessed user engagement was measured as frequency of general use and upload frequency (a: „How often do you use LMP?"; b: „How often do you upload material on LMP?"). A response scale from 1 ("less frequently than once per month") to 6 ("daily") was applied, including an additional option "I don't know". Despite no direct connection between actual user data (due to data privacy), this allows for an approximate allocation of the respondents compared to all tracked users. Second, we asked for the users' motivation to share their educational resources on LMP using seven items on a five-point Likert scale from 1 ("disagree entirely") to 5 ("agree entirely and in full") and one additional open text field. According to the SDT and previous motivation research[37], motivations were classified as extrinsic (external; introjected; identified; integrated regulation) and intrinsic motivation (intrinsic regulation).[38] The operationalisation of items is based on previous studies (see Tab. 2).

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[36]   Our study therefore tracked the behaviour from 17/08/2019 to 11/09/2019 (pre-launch phase) and from 12/09/2019 to 07/10/2019 (post-launch phase).

[37]   Cf. Amabile et al. 1994, Hamari/Sjöklint/Ukkonen 2016, Tremblay et al. 2009, Vallerand et al. 1992, Wilkesmann 2012.

[38]   Cf. Ryan/Deci 2000.

Motivation	Regulation	Items	Adapted from
EXT	External	Because I make money from it.	Wilkesmann 2012: p. 271 Amabile et al. 1994: p. 7 Tremblay et al. 2009: p. 226
		Because it gets me a reward.	-
	Introjected	Because that is what good colleagues do.	Vallerand et al. 1992: p. 1006
		Because I also use the material of others.	van Acker et al. 2013: p. 182
	Identified	Because sharing is generally a good thing.	Hamari et al. 2016: p. 2059
	Integrated	Because it is a part of my life.	Tremblay et al. 2009: 226
INT	Intrinsic	Because it feels good to help others with it.	Kakanhalli et al. 2005: 142

Tab. 2: Operationalisation of User Motivations. EXT: extrinsic; INT: intrinsic

The order of motivation statements was randomised when presented to the participants. Before collecting personal data in the last section (gender, age, federal state, type of school, school subject), an open text field gave respondents the opportunity to further comment on LMP and its badge system.

5.3   Data Analysis

Before analysis, the tracking and survey data were coded to be used in SPSS. Besides the descriptive analysis, we conducted independent *t*-tests as well as *Chi²*-tests to explore the gamification effects, thus differences between the experimental and control group. For further context information, we will present the participants' open comments on the platform.

6.   Results

6.1   Sample Description

For a description of the tracking data, subgroups were computed by looking at the upload behaviour in the year before the launch (i.e. 12/09/2018 until 12/09/2019). In that year, 157 of the 2083 observed authors had not uploaded any documents (see Tab. 3). However, most authors had uploaded material in a low frequency, while a very small group had shared documents every month or more frequently. Regarding these subgroups, there are no significant differences between the experimental and control group before the launch.

Subgroups according to upload frequency	Group E % (N)	Group C % (N)	Chi²	p
monthly or more frequent	2.5% (26)	2.0% (21)		
less than monthly to quarterly	9.5% (100)	8.4% (85)		
less frequent than quarterly	81.3% (858)	81.3% (835)	2.571	.463
uploaded nothing from 09/18 to 09/19	6.8% (72)	8.3% (85)		

Tab. 3: Description of the tracked users by upload frequency subgroups before the launch. Chi²: Chi²-value; *p*: significance. *N* = 2083 with *N_E* = 1056 and *N_C* = 1027

According to the survey ((2); n_E = 85; n_C = 65; response rate = 7.2%), 58% of the participants share material at least monthly and 42% less frequently. If participants do not overestimate, this shows that the subgroup of people with a high upload frequency are over-represented when compared to the complete population captured by the tracking data (see Tab. 3).

The sample includes teachers from each federal state (except Brandenburg) and also from abroad (10.7%, mostly from Switzerland and Austria). The average age is 40.71 years (SD = 13.63). Regarding sociodemographics (Tab. 4), there are no significant differences between E and C. Unfortunately, it is not possible to prove whether this corresponds to the population of authors on LMP, as the platform collects such information only on a voluntary basis.

	Value	Group E % (n)	Group C % (n)	Chi²	p
Gender	Female	83.52% (71)	76.92% (50)	2.111	.348
	Male	12.94% (11)	20.00% (13)		
	Non-binary	1.17% (1)	0.00% (0)		
	No answer	2.35% (2)	3.07% (2)		
Age	Under 21	0.00% (0)	1.53% (1)	47.217	.382
	21-30	29.41% (25)	16.92% (11)		
	31-40	34.12% (29)	24.62% (16)		
	41-50	10.59% (9)	24.62% (16)		
	51-60	14.12% (12)	16.92% (11)		
	Over 60	5.88% (5)	10.76% (7)		
	No answer	5.88% (5)	4.61% (3)		
School form	Elementary School	27.05% (23)	38.46% (25)	7.480	.381
	Hauptschule	5.88% (5)	3.07% (2)		
	Realschule	7.05% (6)	9.23% (6)		
	Gymnasium	17.64% (15)	10.76% (7)		
	Gesamtschule	11.76% (10)	12.30% (8)		
	Special School	5.88% (5)	0.00% (0)		
	Vocational School	1.17% (1)	1.53% (1)		
	other	22.35% (19)	20.00% (13)		
	no answer	1.17% (1)	4.61% (3)		

Tab. 4: Sociodemographic survey data. *n* = 150, with *n_E* = 85 and *n_C* = 65. Chi²: Chi²-value; *p*: significance

6.2 Effects on User Engagement

During the investigated period of 25 days, users from group E had, on average, 3.54 days (SD_E = 5.39) with an active session and slightly but significantly differed from group C (M_C = 2.91, SD_C = 4.96, $t(1922)$ = -2.648, p = .008, d = 0.12). Referring to the tracking data, the presence of the trophy system therefore seems to have a small positive effect on the activity and frequency of website visits. However, it must be noted that the standard deviation is very high, and a very weak but significant difference has already existed before the launch (M_E = 4.59, SD_E = 6.87; M_C = 3.96, SD_C = 6.41, $t(1922)$ = -2.081, p = .038, d = 0.06). According to the survey data, there is no significant difference for the teachers' self-assessed frequency of generally using LMP (M_E = 3.54, SD_E = 1.70; M_C = 3.94, SD_C = 1.78, $t(147)$ = -1.405, p = .162, d = 0.23) and uploading own resources (M_E = 2.05, SD_E = 1.13; M_C = 2.13, SD_C = 1.23, $t(138)$ = -.376, p = .708, d = 0.07).

Apart from the frequency of use and uploads, badge trigger actions were tracked. As can be seen in Tab. 5, only two of eight investigated badge actions revealed significant, however weak, differences between E and C. Overall, the percentages of users who have performed a promotional action are lower in the control group. This suggests a weak tendency towards a positive gamification effect that is not significant due to too few cases.

Badge trigger action	N		Badge actions performed by		Chi²	p	w
	E	C	in Group E	in Group C			
Change profile picture and background image	912	922	5.6% (51)	2.0% (18)	16.776	<.001	0.10
Change description text in profile	692	668	8.1% (56)	4.0% (27)	9.732	.002	0.08
Write blog article	1053	1022	0.4% (4)	0.1% (1)	1.716	.190	0.03
Generate voucher	1052	1027	1.0% (11)	0.4% (4)	3.123	.077	0.04
Place material in sale	1039	1019	1.4% (15)	0.9% (9)	1.402	.237	0.03
Update material and notify customers	1042	1020	0.7% (7)	0.4% (4)	0.760	.384	0.02
Reply to feedback on material	1051	1022	0.6% (6)	0.4% (4)	0.353	.553	0.01
Upload something in 2 consecutive weeks	1035	1012	1.4% (14)	1.1% (11)	0.299	.584	0.01
Upload something in 3 consecutive weeks	1040	1013	0.9% (9)	0.5% (5)	1.047	.306	0.02

Tab. 5: Results of the badge action tracking. Chi²: Chi²-value; p: significance; *w:* effect size

6.3 Effects on User Motivations

Responses to the questionnaire indicate diverse motivations to share own teaching resources (Fig. 1). The vast majority of respondents in the experimental as well as the control group reveal a high intrinsic motivation and identify with the idea of sharing as *helping others*. External motivations are less important to the authors of LMP, but money seems to be a stronger motivator than physical rewards.[39] According to the conducted independent *t*-tests, there are no significant differences between E and C regarding the level of different motivations (see Tab. 6).
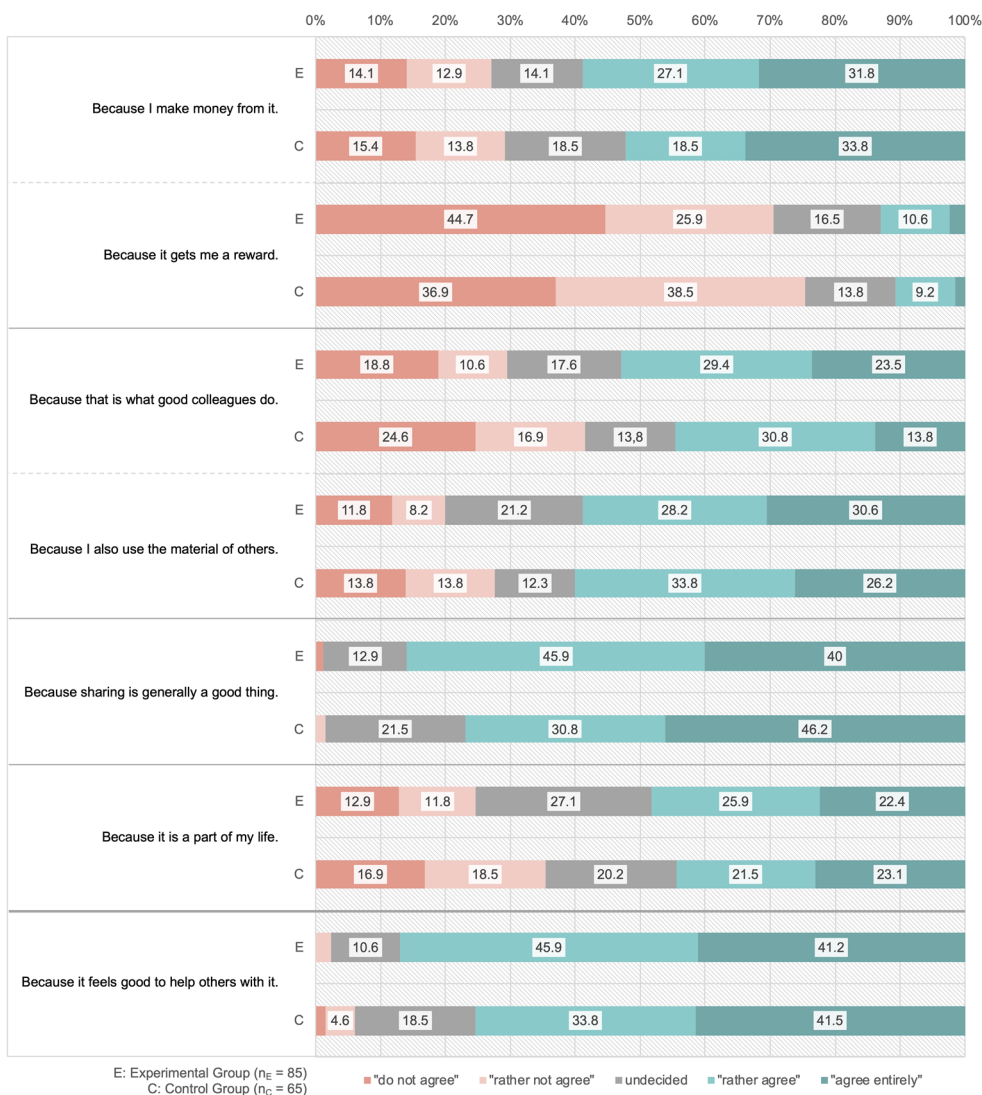

Fig. 1: Motivations to share material on LMP. Percentages < 3% not labelled. For regulation and motivation types, see Tab. 2

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[39]   *Rewards* refer to physical goods earned in promotion campaigns as described in section 2.

Items	M_E (SD_E)	M_C (SD_C)	t	p	d
Because I make money from it.	3.49 (1.42)	3.42 (1.47)	.332	.741	0.05
Because it gets me a reward.	2.00 (1.12)	2.00 (1.02)	.000	1.000	0.00
Because that is what good colleagues do.	3.28 (1.43)	2.92 (1.43)	1.527	.129	0.25
Because I also use the material of others.	3.58 (1.32)	3.45 (1.38)	.587	.558	0.10
Because sharing is generally a good thing.	4.24 (.77)	4.22 (.84)	.151	.880	0.03
Because it is a part of my life.	3.33 (1.30)	3.15 (1.42)	.787	.432	0.13
Because it feels good to help others with it.	4.26 (.74)	4.09 (.96)	1.196	.234	0.26

Tab. 6: t-test regarding motivations. n = 150 with n_E = 85 and n_C = 65. 1 = "do not agree at all"; 5 = "agree entirely". *M*: mean; *SD*: standard deviation; *t*: *t*-value; *p*: two-tailed significance; *d* = effect size

It should also be mentioned that many respondents (*n* = 49) used the open text field to name further motivational reasons. Many of them named the intrinsic motive 'fun' (*n* = 12) or that sharing on the website makes the effort of creating material more worthwhile (*n* = 14). The latter could also be seen as a hybrid of the reasons *sharing as a good thing* and *collegiality*. Other motives mentioned were, for example: fair compensation, overview of the material, feeling of solidarity, appreciation, inspiration, feedback, enthusiasm for one's own subject, publicity, and the possibility of comparison with other materials and pedagogical approaches.

The participants' opinion about the badge system is mixed. In the control group only 23.1% state that they want access to a badge system and 46.2% do not. In the experimental group, only 25.9% want to earn more badges, while 52.9% do not. Interestingly, 25.9% would even like to deactivate their trophy system, but almost half of the participants want to keep it. This mixed feedback is further expressed in comments entered into the open text field.

Example for ambiguous feedback:

> "The trophy system is merely a gimmick. But in my opinion, it helps especially beginners to discover the possibilities of LMP, whose functionality might not be obvious at first sight. But for experienced LMP people it is certainly not of great value. Making some (!) trophies public might increase the attraction to acquire them." (secondary school teacher of mathematics and physics, 37 years old)

Example for positive feedback:

> "Especially at the beginning the trophies really motivate to share something with confidence! Thank you." (Montessori home-school teacher, 37 years old)

Examples for negative feedback:

> "Sorry, that's very kind, but I feel a little bit ridiculed with it. I'm also motivated without the slightest trophies!" (Former teacher, 62 years old)
> "Reward systems can be used when working with children. I am 46 years old!!" (primary school teacher, 46 years old)

7. Discussion

In this paper, we have presented results of a mixed-method experimental study examining the effects of the integration of a badge system into a digital sharing platform for teaching resources on (a) user engagement and (b) motivations to share.

(a) The tracking of user data has revealed few minor differences between the experimental (N_E = 1056) and control group (N_C = 1027). Users of the experimental group showed a slightly higher user engagement in terms of active session days and the performance of simple author activities awarded with badges, such as uploading a profile picture or updating the profile description. In contrast to the tracked data, we found no significant difference between the experimental (n = 85) and the control group (n = 65) according to the survey and, thus, the respondents self-assessed user engagement.

(b) Motivations for sharing were manifold, and most users do not indicate only one reason, contradicting the SDT. The surveyed sample of teachers, however, is stronger driven by motivations that tend towards intrinsic and by the idea of sharing than by external motivations (monetary or promotional rewards). They state mixed opinions about the newly implemented badge system and its usefulness as motivator for an improved user engagement.[40] No differences between the examined groups were found regarding the participants' motivations to share material.

Thus, we cannot prove that gamification as external motivator improves user engagement and motivations for sharing own teaching material on a digital platform. It remains uncertain whether the users of LMP or teachers in general are the ideal target group for the badge system.

7.1 Limitations

Even though the present work could already draw on prior methodological knowledge, it was confronted with problems and limitations that have to be mentioned.

Firstly, the implementation of the trophy system led to considerable delays, which is why the period of examination was shorter than planned. For many of the badge trigger actions, 25 days may have been too short – one possible reason that most effects were not significant. While some of the underlying promotional actions are obviously necessary to complete a profile and quickly made (e.g., an update of profile and background images), others are more complex and time consuming. Further, the time frame may have been too short to observe a long-term change in motivations. It may also be plausible that motivations cannot be changed by external motivators but are pre-existing traits that are connected to the user's individual

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[40]   These results are in line with previous research on sharing platforms, e.g., Hylen 2007, Pegler 2012, van Acker et al. 2013, de los Arcos et al. 2017.

personality, as the SDT suggests. The post-launch examination mainly took place during the autumn school holiday phase. Thus, the tracking data does not compare to the usual user behaviour, which is probably why we observed a drop in the active session days of 1.5 days in both groups after the launch. A whole calendar year would be more appropriate as a meaningful survey period in order to also record the course of the school year. A longer survey period could also put a possible novelty effect of the trophies into perspective. It is unclear whether the users analysed here were subject to the effect and, for example, only performed certain actions in order to *test* the badge function. This can only be detected by intensive user data analyses (e.g. session analyses). Furthermore, it was not tested whether the order of the badges in the list on the overview page was decisive for their fulfilment. Indications for this would be that the two trophies with high significance in the badge action tracking test are at the top of the trophy list. The basic prerequisite for the analysis of the number of sessions would be the reliability of the data used, which can vary greatly depending on the data source, even if the test period is long, e.g., if some users disable cookies.

Secondly, the group divisions (E and C) and the sample of the survey are to be mentioned critically. Based on the session data, there was already a significant difference between the groups in the pre-launch phase. Although this difference increased in the second phase, it is possible that the significant effects in terms of badges are already related to the grouping. In general, it can also be critically discussed if authors or rather previous non-authors are suitable as objects of investigation. It would also be exciting to see to what extent gamification encourages users who have not been active so far to upload their own materials. According to the SDT, they may be lacking high intrinsic motivations, which mainly drive previous authors – besides the monetary motivator.

Thirdly, the relatively low response rate of the questionnaire is problematic. It is possible that only highly motivated people have been participating in the survey. The questionnaire was also based entirely on self-assessment by the users, which is why the objectivity of the results can be questioned in contrast to the neutral user data. However, linking the user data to the questionnaires could provide further insights.

Also, some items were missing in the questionnaire. For example, the intrinsic motive 'fun in creating', among others, was measured as motivation but reported in the comments by E and C participants. It seems plausible, however, that the gamification elements increase users' joy to use the platform and share own teaching resources. Furthermore, there was no statement on the trophy system that allowed an actual evaluation of the feature. The queried statements rather served as indicators for an approval or dislike, but not as clear evidence. It is also possible that another theoretical approach, e.g., one that is based on personality types or player types, would have been more appropriate for the concept of the questionnaire and our study.

7.2   Implications for Future Research and Practice

To avoid the limitations of this study, we suggest the following methodological improvements for future research: 1) a longer survey period of at least 12 months, 2) the possibility of presenting temporal developments in user behaviour, 3) a randomisation of the trophy list, 4) comprehensive measurements of sharing motivations and dislike of gamified elements, 5) the linking of user data with explanatory variables recorded by surveys or interviews, and 6) an observation of non-contributors.

The present study endeavoured to cover the tripartite theoretical spheres. Of course, this can be supplemented by further theoretical approaches. For example, theories of *game and play studies* could be used to look at the user engagement with *hidden* or potential *level* badges. These have hardly been researched so far, but it would be interesting to see whether a certain user behaviour indicates that the focus is no longer on sharing but on the playful act of achieving trophies. Other potentially useful theories from *game studies* to further research the influence of the LMP trophy system would be player typology, feedback theory, flow theory, or tutorial theory. Also, a look into theories of media literacy or a reference to economic theory (e.g. linking the badge system to monetary benefits and sales figures) might be interesting. Especially promising for future research may be a more intensive examination of motivations. Qualitative research can be a first way to identify all possible motivations, as existing scales developed by previous quantitative research may not be extensive for the particular use case. According to previous research[41], individual differences of users have to be acknowledged. While the badge system for some may function as a great external motivator to improve user engagement, for others it may be discouraging. Thus, a more in-depth examination of gamification effects based on a user typology may be a promising way.[42]

Recommendations for action in practice also result from the findings of this study. For example, developers should consider enabling a trophy system to be customised according to the personal preferences and motivations of a user. With LMP, even before gamification, users had the option to offer materials for free or for a self-defined price (depending on whether or not they were driven to share by monetary motivations). Platform providers should proceed in a similar way with the game design elements, as users reported very diverse opinions about the badge system.

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[41]   Cf. Hallifax et al. 2019.
[42]   Cf. Barna/Fodor 2019.

Acknowledgements

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