THE HIDDEN POWER OF SMALL REWARDS: EXTERNAL REWARDS IN ONLINE LEARNING

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Abstract:

Online learning and blended learning became important ways of learning and teaching in institutions of higher education as well as corporate universities. Although research increased dramatically during the last years, several questions remain open to answer. Especially the role of motivation has been examined scarcely so far. We focus on the influence of rewards on learning motivation as well as on learning outcomes. Our data from an experiment challenge the prevailing view that all tangible rewards undermine intrinsic motivation. We find that small rewards did not undermine intrinsic motivation and significantly enhance learning outcomes (i.e. engagement in and performance on rewarded and non-rewarded tasks as well as test performance).

Keywords: Learning motivation; learning outcomes; small rewards; cognitive evaluation theory; online/blended learning

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1 INTRODUCTION

Online learning became an important way of learning and teaching in business schools (Arbaugh, Godfrey, Johnson, Pollack, Niendorf, & Wresch, 2009) and corporate universities (Rudestam & Schoenholtz-Read, 2009). For organizations online learning allows delivering contents to all employees all over the world, reducing costs for traveling and training facilities and enabling just-in-time availability (Burgess, 2003; DeRouin, Fritzsche, & Salas, 2005). Corporate universities use online learning to develop globally distributed workforce (e.g., business and task specific skills, desktop applications) and to maintain the corporate culture (Rudestam & Schoenholtz-Read, 2009).

Although educational organizations and business firms invested heavily in building infrastructure for online learning in the last years, little is known about how and why learners can learn effectively (Hwang & Francesco, 2010). As practice in online learning is a rapidly changing environment, research is lagging behind. In the last years developments in online learning designs were largely driven by advances in technology rather than by learning theoretical considerations. Hence, scholars call for research on online and blended learning designs building upon established theories in the fields of learning and education science (DeRouin et al., 2005; Rudestam & Schoenholtz-Read, 2009).

Some preliminary studies already drew upon findings from traditional learning environments and found intrinsic motivation to be critical for online learning. Intrinsic motivation is associated with longer persistence, deeper processing and better performance (Niemiec & Ryan, 2009; Vansteenkiste, Lens, & Deci, 2006). However, only few studies focused upon the learning motivation within virtual learning contexts so far (Chen & Jang, 2010).

Owing to the rising importance of online learning in business firms as well as higher educational institutions, organizations seek to influence learning motivation. In this connection, educators in universities as well as management development programs often make use of rewards (e.g., bonus points, awards, promotions, etc.). Moreover, as other possibilities to affect learning motivation (e.g., interpersonal relationship and learning climate) can hardly be used to influence learning motivation in online learning environments, using rewards seems even more promising.

Yet, scholars discussed the use of extrinsic rewards in order to enhance motivation thoroughly in the past. Deci, Koestner and Ryan (1999; 2001) conducted a comprehensive meta-analysis, showing that tangible rewards reliably undermine intrinsic motivation ("corruption effect"; (Deci, 1975). This effect is widely recognized and also referred to as "crowding-out effect" (Frey & Oberholzer-Gee, 1997; Osterloh & Frey, 2000) or "hidden costs of reward" (Lepper & Greene, 1978). However, this effect has not been studied in terms of online learning until now. What is more, Deci at al. (2001) as well as Osterloh & Frey ("crowding-in effect"; 2000) argue that it could be possible to enhance intrinsic motivation through extrinsic rewards. Nonetheless, this effect has been studied scarcely (not at all in online learning) and it remains unclear under which conditions it might appear.

Against this background, we empirically investigate the role of extrinsic rewards on learning motivation in online learning settings. By conducting a field experiment with a rewarded (treatment) and a non-rewarded (control) group in a university context, we test

how small, symbolic rewards (in form of bonus points) influence intrinsic and extrinsic motivation.

Thereby, our paper makes three contributions to existing literature: First, we are one of the first studies empirically examining, if small, symbolic rewards can enhance intrinsic motivation. Second, our experiment is the first testing the presence or absence of the undermining effect in an online learning setting. Third, we also investigate the effect of small, symbolic rewards on learning outcomes.

The paper is structured as follows: After this (1) introduction, we give an overview about the (2) theoretical background and the state of the field, deriving hypotheses from the literature. In the subsequent sections we first describe the (3) method, then present the (4) results, and discuss the (5) results afterwards. Thereafter we identify some (6) limitations as well as avenues for further research and finally we present (7) practical implications of our findings.

2 THEORETICAL BACKGROUND & STATE-OF-THE FIELD

Online learning can be described as teaching and learning techniques using the Internet as delivery platform (Wu & Hwang, 2010). Online learning can be "pure", or "blended" serving as a substantial supplement for traditional learning environments (Tallent-Runnels, Thomas, Lan, Cooper, Ahern, Shaw, & Liu, 2006). Although both concepts have attracted much attention in research and practice in the last decade, research often lags behind and lacks theoretical grounding (Arbaugh, 2008; Arbaugh et al., 2009). Especially established theories in the fields of learning and education science are scarce (DeRouin et al., 2005; Rudestam & Schoenholtz-Read, 2009).

2.1 Motivation in online and blended learning setings

In particular, motivation has been identified as a critical factor in traditional learning settings, but research has widely neglected to focus on learning motivation in online learning settings (Chen & Jang, 2010). Even less papers exist, which focus on self-determination theory (SDT) (Deci & Ryan, 1985; 2000) in order to explain learning motivation. However, SDT was successfully applied in numerous studies in various fields such as education, business, and sports (Gagné & Deci, 2005), and *"deserves thorough investigations in on-line learning contexts"* (Chen & Jang, 2010). Although the model of Deci & Ryan (1985) has been tested empirically in more than 700 studies in classroom settings (Rienties, Tempelaar, Van den Bossche, Gijselaers, & Segers, 2009), hitherto only few papers examined online learning motivation in the light of SDT.

One paper is Roca & Gagné's (2008) study of the role of technology acceptance in e-learning contexts. They proposed a model, how autonomy support, perceived competence and perceived relatedness influence perceived usefulness, perceived playfulness and perceived ease of use. Their findings suggest that SDT is useful to explain the intention to continuously use the IT. However, the aim of the paper was to "*explain the role of intrinsic and extrinsic motivation in the acceptance of e-learning*" (p. 1597), whereas the intention to learn was beyond the scope of the paper.

Chen & Jang's (2010) field study focused on this point. The intention of their paper was to test a model derived from SDT, hypothesizing a mediating effect of need satisfaction from contextual support on motivation in relationship to learning outcomes. While the effects of contextual support and need satisfaction on motivation were significant, the effects on learning outcomes were insignificant. Although this study provided first valuable insights, especially the question of the relationship of motivation and learning outcomes remains open.

The paper of Rienties, Tempelaar, Van den Bossche, Gijselaers, & Segers (2009) is filling part of this gap by showing that motivation affects the type of contributions to discourse in computer-supportive collaborative learning. They found that highly intrinsically motivated learners contribute more to task-related issues as well as non-task related issues (planning and technical issues). However, this paper focused on collaborative learning, while individual learning was beyond the scope of the paper.

Especially, we are not aware of any experiment in online learning settings examining the role of rewards on learning motivation and learning outcomes. Therefore, it is not surprising that scholars rely upon findings from traditional learning settings. One of the most comprehensive frameworks explaining the effect of external rewards on motivation is cognitive evaluation theory (Deci, 1975; Deci & Ryan, 1985), which is embedded in SDT.

2.2 Cognitive evaluation theory

Cognitive evaluation theory (CET) was referred to as one of seven traditional theories of motivation in organizations by Ambrose and Kulik (1999). When Deci (1971) tested the relationship of intrinsic and extrinsic motivation, which was assumed to be additive, he found that tangible rewards undermined intrinsic motivation whereas verbal rewards enhanced it. CET was formulated to integrate the results from this initial laboratory experiment and following studies (Gagné & Deci, 2005). Subsequently the theory was tested and extended by field studies in various settings, enhancing knowledge about the effects of rewards, feedback, and other external events on intrinsic motivation (Ryan & Deci, 2000).

CET suggests that every reward has to aspects: an informational and a controlling aspect. The informational aspect is associated with the basic psychological need to feel competent (Ryan & Deci, 2000). It basically refers to information for individuals, how effective a behavior was (see self-efficacy; Bandura, 1986). The controlling aspect is associated with thwarting the need for autonomy (Deci & Ryan, 2000). The need for autonomy backs upon DeCharms' (1968) "perceived locus of causality" (PLOC), which refers to the degree individuals attribute the cause of their behavior to internal or external reasons. While intrinsic motivation is associated with an internal PLOC (i.e. autonomous decision), extrinsic motivation is related with an external PLOC (i.e. heteronomous control).

Following CET, external rewards undermine intrinsic motivation by a shifting PLOC. When an initially intrinsically motivating behavior is rewarded, persons attribute their behavior (at least partially) to the external influences (Gagné & Deci, 2005). Thereby the PLOC shifts from intern (e.g., perception that the action is performed for fun and interest) to extern (e.g., perception that the behavior is presented due to the reward).

2.3 Motivation in traditional learning settings

CET was the first theory arguing that external rewards may not be treated as unitary concepts (Deci et al., 2001). Even Deci (1971) differentiated between tangible and verbal rewards. In the following years, researchers tested the theory by using several other external rewards, such as threats, deadlines, directives, pressured evaluations, and imposed goals (Ryan & Deci, 2000). In a comprehensive meta-analysis of 128 laboratory experiments (Deci et al., 1999; 2001) differentiated several categories of verbal and tangible rewards and showed the effect of these rewards on intrinsic motivation. The meta-analysis confirmed the findings that verbal rewards (i.e. positive feedback) enhance intrinsic motivation. Additionally, it was found that all expected tangible rewards undermine intrinsic motivation, while unexpected tangible rewards had no effect on intrinsic motivation. Further differentiating expected rewards, Deci et al. (1999; 2001) revealed that task contingent rewards influenced intrinsic more negatively than non-task contingent. The category that undermined intrinsic motivation the most in the entire analysis, was rewards depending on the task-performance and where. However, this is the type of reward "*that one would typically find in the real world.*" (Deci et al., 2001:13).

However, the participants of those studies received the information, how their performance was in relationship to others (e.g., "your performance was in the bottom 10%"). Hence, for most participants, performance feedback was negative, resulting in low levels of perceived competence and in low levels of perceived autonomy (cf. Deci et al. 2001). In our opinion, with rewards depending on the *absolute* performance (e.g., "your answers were 83% correct") the informational aspect (feedback on the performance) may rule out the controlling aspect. Yet, research has also provided evidence that perceived competence does not enhance intrinsic motivation, when the need for autonomy is thwarted (cf. Ryan & Deci, 2000). Therefore, scholars suggest to support autonomy by offering choice and opportunities for self-direction (Deci & Ryan, 1985).

To summarize, CET initially been formulated to explain positive and negative effects of external rewards on intrinsic motivation. Tangible rewards were found to undermine intrinsic motivation, as the controlling aspects rule out the informational aspects. Hence, the PLOC shifts from internal to external. In contrast, research revealed that verbal rewards enhance intrinsic motivation, as the informational aspect rules out the controlling aspect. In this context, also tangible rewards *could* enhance intrinsic motivation, if the informational aspect was higher than the controlling aspect. However, the question if and how this could be achieved is still open to answer.

Osterloh and Frey (2000) build upon CET and develop this thought further. They argue that symbolic rewards, such as a guest handing over a bunch of flowers for an invitation may enhance intrinsic motivation ("crowding-in") or at least not undermine it. In contrast, the host may feel controlled, when guests try to present money as a gift. The underlying logic is congruent with CET: when the informational aspect is higher than the controlling aspect, intrinsic motivation will be enhanced. Yet, Osterloh and Frey (2000) do not put this argument any further, and neglect to define "symbolic rewards".

We pick up this discussion by taking "insufficient justification" (Aronson, 1969; Festinger, 1957) into account. Insufficient justification builds upon the theory of cognitive dissonance (Aronson, 1969; Festinger, 1957). In their classic experiment Festinger and Carlsmith (1959) asked two groups of students to perform dull and boring

tasks and afterwards tell a colleague (who was a confidant of the experimenters) that the task is interesting. For this lie the two groups of students were paid $ 1 and $ 20, respectively. Thereafter they were asked how they really enjoyed the task. Festinger and Carlsmith (1959) found that both groups reported the task to be more enjoyable than the non-rewarded group, but those students who had a smaller external reward reported the task to be even more enjoyable than the group with the bigger external reward. According to the concept of insufficient justification individuals will seek for other justifications, if external justifications are widely. These results have been confirmed by several subsequent experiments (Aronson, Wilson, & Akert, 2007).

Hence, we suggest that, if an external reward is big enough to serve partially as an external justification, it may trigger external motivation "to get the activity started" (in our experiment: doing home exercises). According to the controlling aspect of external rewards, this may decrease intrinsic motivation. However, if it is small enough to be insufficient to fully justify the behavior (we refer to this as "symbolic rewards"), other internal justifications (e.g., "I do it is interesting") are taken into account. Hence, the informational aspect may (over-)compensate the controlling aspect. Therefore, we hypothesize that extrinsic rewards will not undermine intrinsic motivation.

H1: Intrinsic motivation within the rewarded group is at least equal to the non-rewarded group.

Additionally, as argued above, we suggest that the external reward is big enough to serve partially as an external justification. Hence, we assume that extrinsic motivation will increase within the rewarded group leading to a higher level of extrinsic motivation than the non-rewarded group. While the first hypothesis is contrary to the prevailing view, this hypothesis is perfectly in line with the previous studies on external rewards within the CET.

H2: Extrinsic motivation within the rewarded group is higher than within the non-rewarded group.

2.4 Learning motivation and learning outcomes on rewarded tasks

Several studies show that intrinsic learning motivation is critical to learning outcomes (Nimiec & Ryan, 2009). For example, Vansteenkiste et al. (2006) showed that intrinsic goals facilitated higher engagement in learning activities, deeper conceptual understanding and greater persistence.

Laboratory experiments as well field studies support the suggestion that all tangible rewards (facilitating extrinsic motivation) lead to poorer performance on difficult tasks requiring creativity. However, tangible rewards were also found result in at least comparable performance on simple tasks (cf. Gagné & Deci, 2005). Extrinsic motivation was actually found to lead to better performance on mundane tasks (e.g., rote learning) (Grolnick & Ryan, 1987).

Within our experiments, students had the opportunity to do home exercises. The home exercises were composed of questions aimed at reproducing theory as well as questions, which focused on applying what has been learned. Yet, in general tasks did mainly draw upon convergent thinking rather than divergent thinking. Furthermore, students could also use external resources, such as textbooks, the questions were clear without

ambiguity (multiple choice) and students had enough of time to answer the question. Hence, we expect in line with previous studies that rewards will lead to equal or higher engagement in and better performance on the rewarded tasks (i.e. homework assignments) during online learning.

H3: Submission rates of home exercises are higher in the rewarded group than in the non-rewarded group.
H4: Performance on home exercises is better in the rewarded group than in the non-rewarded group.

2.5 Learning motivation and learning outcomes on non-rewarded tasks

Intrinsic motivation was found to lead to higher performance on tasks, which are not rewarded. In contrast, externally motivated people may not participate in any non-rewarded tasks (Deci & Ryan, 2000). According to the prevailing view, external rewards are supposed to undermine intrinsic motivation, which would lead to lower engagement on non-rewarded tasks. However, as we hypothesized in H1, we suggest that intrinsic motivation will be at least equal for both groups. Hence, we hypothesize that activities in voluntary exercises (i.e. non-rewarded tasks) are at least equal for both groups.

H5: Numbers of voluntary exercises are at least equal for both groups.
H6: Performance on voluntary exercises is at least equal for both groups.
H7: Numbers of different voluntary exercises are at least equal for both groups.

2.6 Learning motivation and test performance

Experiments within CET showed that intrinsic motivation was also related with better test performance (Ryan, Connell, & Deci, 1990). This is not surprising, as intrinsic motivation is also related with conceptual learning and higher engagement. In contrast, extrinsic motivation is related with less desirable learning outcomes (cf. Gagné & Deci, 2005). Hence, if intrinsic motivation is undermined by external rewards, the rewarded group in our experiment should have a poorer exam-performance than the non-rewarded group.

However, we hypothesize that the undermining effect does not appear, when small rewards are granted. We actually suggest that the level intrinsic motivation will not change or even increase. Hence, we assume performance on the exam at the end of the course to be at least equal for both groups.

H8: Performance on the exam is at least equal for both groups.

3 METHOD

In order to test the effect of small rewards on motivation, we conduct a field experiment in a blended learning course for undergraduate students. The topic of the class is an introductory course to the field of human resource management that is compulsory for all students studying economics and business. The course is held in ten units in a lecture hall and is supported by a comprehensive learning management system with

approximately 800 different multiple-choice exercises (voluntary exercises) and several topic-related discussion forums. Students receive their grades depending on their performance on a multiple-choice exam at the end of each course.

3.1 Experimental design

In order to examine our hypotheses, we used a post-test only/control group design. As the course is held two times each term, we arranged the control condition in the first half term and the treatment condition in the second. In both conditions, students had the possibility to do eight home exercises. The control group received feedback on their performance, as they were informed how many points they would have reached (e.g., 0.43 of 0.7 points). The feedback was exactly the same for the treatment group, yet they actually received bonus points for doing their home exercise. However, students could only receive a small reward: 0.7 points per home exercise (i.e. 0.583 % of the points on the exam).

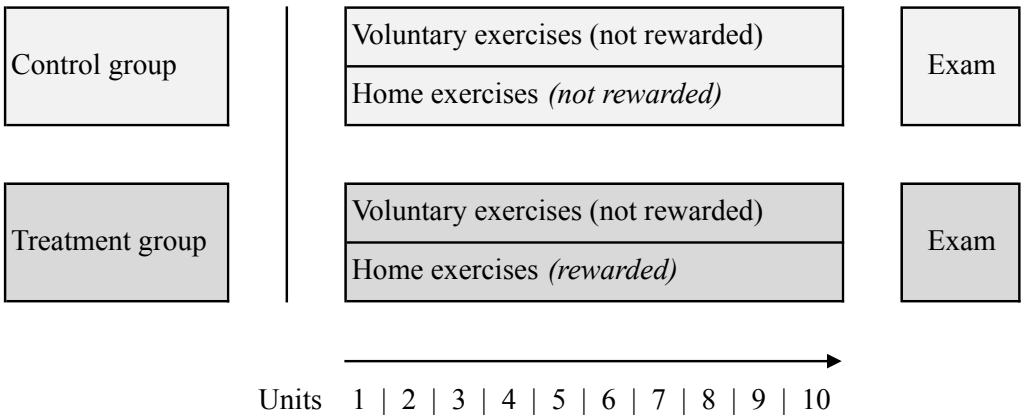

Figure 1: Experimental design

3.2 Data collection & data analysis

We collected data about the use of the learning management system directly from the e-learning center of the university. We received data for the variables “number of rewarded exercises”, “performance on rewarded exercises”, “number of non-rewarded exercises”, “number of correctly solved exercises”, and “number of different exercises” enlisted in the two half semester courses. For the tests we eliminated inactive students (i.e. not doing any rewarded and non-rewarded exercise). The number of active students was 828 in the control group and 822 in the treatment group.

To collect data about the intrinsic and extrinsic motivation, we developed a scale with six items with closed questions and one item with an open question. Participants were asked to assign 100 points to three different categories of questions build upon CET: intrinsic motivation (e.g., “I did my home exercises, because I enjoy studying for this subject”), extrinsic motivation (e.g., “I did my home exercises, because I will get into trouble (e.g., loosing my grant), if I fail at the exam.”) and a open category. 98 students from the control group and 254 from the treatment group responded the questionnaire.

We received the data for the variable “exam performance” directly from examination office of the university, indicating that 438 students of the control group and 512 students of the treatment group took the exam. Additionally, we collected several control variables (e.g., sex, years of study) to check for alternative explanations. For all variables distributions were found to be not normal. All variables except the “exam performance” showed a positive skew, which in fact was negatively skewed. Hence, we used Mann-Whitney-tests to examine differences between the treatment group and the control group.

4 RESULTS

Our hypothesis 1 and 2 were aimed at examining the appearance of the undermining effect. Levels of intrinsic motivations in the treatment group (Mdn = 0.00) showed a positive trend, but did not differ significantly from the control group (Mdn = 0.00; U = 11,639; p = 0.146; r = -0.06), supporting our first hypothesis. Extrinsic motivation in treatment group (Mdn = 33.00) differed highly significantly from the control group (Mdn = 0.00; U = 5,216; p = 0.000; r = -0.46), confirming our second hypothesis.

Hypothesis 3 and 4 investigated the effect of small rewards on submission rates and performances on home exercises. Submission rates were highly significantly higher in the treatment group (Mdn = 3.00) than in the control group (Mdn = 0.00; U = 176,629, p = 0.000; r = -0.44), providing evidence for our third hypothesis. Performance on the submitted home exercises was also higher in the treatment group (Mdn = 1.24) than in the control group (Mdn = 0.00; U = 189,853, p = 0.000, r = -0.40), supporting our fourth hypothesis.

Our hypothesis 5 to 7 tested the effect of small rewards on non-rewarded tasks. We found that individuals in the treatment group (Mdn = 344.50) solved highly significantly more voluntary exercises than in the control group (Mdn = 124.00; U = 271,418, p = 0.000, r = -0.18), supporting our fifth hypothesis. Individuals in the treatment group doing voluntary exercises also performed highly significantly better on voluntary tasks, solving more exercises right (Mdn = 153.50) than their counterparts in the control group (Mdn = 45.00; U = 273,397; p = 0.000; r = -0.17), providing evidence for our sixth hypothesis. Moreover, students performing non-rewarded exercises in the treatment group also solved a higher number of different exercises (rather than repeating only the same) (Mdn = 316.00) than those in the control group (Mdn = 134.00; U = 271,865; p = 0.000; r = -0.17), confirming our seventh hypothesis.

Hypothesis 8 was aimed at examining the effect of small rewards on exam-performance. The performance on the exam was significantly better for students in the treatment group (Mdn = 84.00) than in the control group (Mdn = 84.00; U = 104,104; p = 0.029; r = -0.06), providing evidence for our eighth hypothesis. We further conducted an ad-hoc analysis showing that highly significantly more students in the treatment group (62.28 %; n = 512) than the control group (52.89 %; n = 438; U = 308,358; p = 0.000; r = -0.09) took the exam.

Variable	No reward			Small reward		
	Mdn	M	S.D.	Mdn	M	S.D.
Intrinsic motivation	0.00	18.83	30.47	0.00	19.63	27.03
Extrinsic motivation	0.00	14.13	32.61	0.00	33.00	31.82
Submitted home exercises	0.00	0.80	1.34	3.00	3.48	3.17
Performance on home exercises	0.00	0.49	0.96	1.24	1.83	1.85
Number of voluntary exercises	124.00	646.97	1,278.63	344.50	837.91	1,121.53
Correctly solved voluntary exercises	45.00	371.34	930.25	153.50	475.82	709.87
Different voluntary exercises	134.00	551.93	930.88	316.00	727.52	906.46
Performance on the exam	84.00	80.10	19.09	84.00	82.55	19.62

Table 1: Responses to key variables

5 DISCUSSION & CONCLUSION

According to the prevailing view of CET, all tangible rewards reliably undermine intrinsic motivation (cf. Deci et al., 1999; 2001). However, in our experiment in an online learning setting, we were able to challenge this view and investigate the "power of small rewards". We found that small rewards enhanced extrinsic learning motivation, while intrinsic motivation showed a positive, but insignificant trend. Furthermore our data provide evidence that small rewards are related with higher engagement and better performance in rewarded and non-rewarded tasks as well as with better test performance.

5.1 Small rewards: The absence of the undermining effect

Contrary to the prevailing view we were able to show that tangible rewards do not necessarily undermine intrinsic motivation. In our experiment we found a trend towards an increased intrinsic motivation, indicating a shift in the perceived locus of causality from external to internal. This effect is remarkable, as our experiment falls along the category, which was found to undermine intrinsic motivation the strongest within Deci et al.'s (1999; 2001) meta analysis ("real world setting").

Our data support the theoretical assumption of scholars such as Deci et al. (1999; 2001) and Osterloh & Frey (2000) that an enhancing effect can appear for tangible rewards, when the (1) informational aspect of the rewards is larger than the (2) controlling aspect. First, to minimize the controlling aspect, students had the option to freely choose to do the home exercises or not. Thereby, we provided choice to students, which was found to enhance intrinsic motivation (Zuckerman, Porac, Lathin, Smith, & Deci, 1978). Second, to enhance the informational aspect, students received feedback, how well they would have performed on the exam. Furthermore, we not only informed them about their performance, but also informed them, which answers were wrong, and provided them with the sample solution. Hence, small rewards within our experiment can be suggested to have a high informational aspect, as they "*provide satisfaction of the need for competence and thus enhance intrinsic motivation*" (Deci et al., 1999: 628).

However, one could argue that external rewards are too small to actually trigger this behavior (the best student achieved a bonus of 3.5 %). We encourage this view and draw upon insufficient justification, arguing that intrinsic motivation may be enhanced, when rewards are very small. When small rewards are not sufficient to fully justify the

behavior, individuals have to internalize the regulations by finding other, more internal justifications for their actions.

At this point, we also stress the importance of extrinsic motivation in the internalization process of external regulations (cf. Ryan & Deci, 2000). Extrinsic motivation is an indispensible prerequisite for the internalization effect to appear (Deci et al., 2001). If any motivation is missing, learners will not participate in the task, and thus they have no chance to recognize its importance or to discover their interest in the topic.

As the median of intrinsic motivation was zero for both groups, an alternative explanation may be that participants in our experiment perceived tasks as not intrinsically motivating. Thus, one could argue that intrinsic motivation could not be undermined by extrinsic rewards, "*because there is little or no intrinsic motivation to be undermined.*" Deci et al. (2001: 14). However, this is just the opposite of what actually occurred. Several students (34,69 % of the students in the non-rewarded group and 44,49 % of the students in the rewarded group) reported to be intrinsically motivated. Moreover, for these students there is a trend toward an *enhanced* intrinsic motivation rather than a decrease in intrinsic motivation.

5.2 Small rewards: Better learning outcomes on rewarded tasks

Our data show that small rewards can lead to higher submission rates and better performance on home exercises. In line with existing literature, this effect can largely be explained by the rise in extrinsic motivation. As the home exercises were rewarded, students worked on their home exercises in order to achieve bonus points. Performance of home exercises also increased, as bonus points were contingent on home exercises performance. Students could only achieve full bonus points if they made an effort.

Again it is not reasonable that small rewards were sufficient to fully justify the behavior. As more students performed their home exercises in the rewarded group, it could have been assumed that the surplus of students only performed their home exercises due to the rewards. If this had been the case, intrinsic motivation throughout the group would have decreased. Yet, quite the contrary was found. Although more students performed their home exercise there was actually a trend towards increased intrinsic motivation, indicating that rewards were an insufficient justification.

5.3 Small rewards: Better learning outcomes on non-rewarded tasks

Students in our experiment also practiced more non-rewarded online exercises, answered more different exercises and solved more exercises correctly. We expected that individuals would perform non-rewarded tasks because of the rise in intrinsic motivation. However, although there was a positive trend toward enhanced intrinsic motivation this effect was insignificant, ruling out our explanation.

Hence, we propose two alternative explanations of this effect. First, as the rewarded tasks were quite similar to the unrewarded tasks, students may have practiced more in order to achieve higher bonus points on the rewarded tasks. Yet, as the rewards were very small, it is unlikely that this explanation accounts fully for the increase. If rewards are too small to justify the rewarded behavior, it is even less likely that students make an additional effort to reach the bonus points.

Second, students may have built internal justifications that were not covered by our measurement. Activities of students may have been neither internally nor externally regulated (which are the prototypes of intrinsic and extrinsic motivation measured in our experiment). Students may have performed non-rewarded tasks due to some type of autonomous, extrinsic motivation (cf. Gagné & Deci, 2005). For example, due to the feedback students may have recognized sooner that they have to practice more to pass the exam, they may have recognized the value of studying the matter (e.g., for their career), or their behavior may have become quasi-automatically (e.g., consistency in behavior).

5.4 Small rewards: Better performance on the exam

Our data further provided evidence that small rewards can lead to better performance on the exam. As we have shown, individuals practiced more rewarded as well as non-rewarded exercises, showing that students were better prepared for the exam. Hence, we argue that the better preparation is accountable for the better performance on the exam. While the difference of test performances between the two groups seem marginal at a first glance, it is important to see that exam-performance rose although more students took the test.

Put in a nutshell, we were able to show that learning motivation can be enhanced through small rewards. When small rewards are administered properly, the undermining effect may not appear. Furthermore, learning outcomes can also be influenced positively. Students do their home exercises more likely and better, engage more in voluntary exercises, and perform better at the exam when they receive small rewards rather than no rewards.

Thus, our findings contribute to existing literature by showing that small, symbolic rewards do not undermine intrinsic motivation. In fact, we revealed that small rewards can enhance learning motivation and learning outcomes, providing valuable insights for the design of online learning settings.

6 LIMITATIONS & OUTLOOK

One limitation of our study is the special sample. As the sample is drawn from undergraduate students, effects may be limited to this sample. Future research may investigate learning motivation in other universities, in work life settings, or even other cultures. More laboratory as well as field studies are needed in order to gain knowledge about the effect of small, symbolic rewards on intrinsic motivation.

We were not able to detect a significant increase in intrinsic motivation. This may be due to three reasons. First, a time span of six weeks may be too short to fully internalize extrinsic regulations (see also Rienties et al., 2009). Second, the need for relatedness may have been thwarted or third, external regulation could have been internalized only partially (e.g., integrated regulation). However, we did not test for autonomous forms of extrinsic motivation, (cf. Ryan & Deci, 2000). We suggest that future research may also investigate these types of motivation to explain learning motivation and learning outcomes in greater detail.

Our study was the one of the first empirically testing the idea of symbolic rewards (Osterloh & Frey, 2000) by taking insufficient justification into account and operationalizing it as small rewards. Yet, the definition of symbolic rewards remains vague and it is still unclear, which rewards can be perceived as symbolic. We therefore call on future research to examine small, symbolic rewards more intensively in order to gain deeper knowledge about the power of symbolic rewards.

Some implications from this study are presented in the following managerial implications section. Thoroughly testing these implications are other promising areas of research not only for educational researchers but also for researchers in the field of organization science and human resource management.

7 PRACTICAL IMPLICATIONS

Our data provide important insights for (1) the design of online-based learning as well as (2) the use of small rewards in general. First, we have shown that learning motivation can be enhanced using small rewards, rising extrinsic motivation without undermining intrinsic motivation. Learners engage more fully in rewarded as well as non-rewarded tasks and show better performance. Furthermore, small rewards can be used to involve more learners and motivate them to deal with the topic. In this regard it is critical that perceive the choice that they can participate in the rewarded task. Thus, providing a small amount of bonus points can enhance intrinsic motivation, while including the task in the evaluation or imposing minus points will probably undermine intrinsic motivation. The perceived choice is also reflected in the individuals' decisions to participate in the course or not. While it may be obligatory for all learners in a program to pass a course, allowing learners to freely decide when to enlist, is also a critical part in keeping up intrinsic motivation and furthermore enhances individuals' commitment to participate in the course, when they have the feeling that their action was self-determined.

Second, our experiment has also implications for small rewards in organizations. In the context of remuneration, organizations can use small rewards, to activate a desired behavior. For example, a formerly bureaucratic organization wants to establish an innovation culture. So far, although employees have several ideas, how processes could be organized more efficiently, but they do not share their ideas due to the prevailing innovation-inhibiting culture. The top-management team may decide to use small rewards, big enough to trigger the sharing of ideas, but small enough to not fully serve as justification. If employees only shared their ideas for the money, the organization may soon be flooded premature ideas. Yet, if they are small enough that employees have to find more internal justifications (e.g., "I share my ideas, because it is important for the long-term success of the firm"), employees may focus on aspects of their ideas, such as quality, feasibility, and potential utility for the firm, as well. However, the balance between "too small" and "too big" cannot be defined for all firms. It is idiosyncratic for the firm and depends on factors such as fit of HRM systems, organizational structure, and of course, the organization's culture.

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