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Gamification in Hybrid Teacher Professional Development

Full research paper

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Abstract

The paper investigates the concept of hybrid (online and face-to-face) teacher professional development for in-service teachers in the light of the emerging concept of gamification. This study makes a case for future researchers to explore the effect of gamification on teacher engagement in teacher professional development programs. The existing literature indicates that gamification leads to better employee engagement. Therefore, the paper argues that it will also lead to better teacher engagement in training programs. A gamified hybrid training program for in-service teachers has been developed. Various game elements like points, badges, and profile customization have been proposed to induce game dynamics in gamification implementations. The paper analyses how gamification leads to better engagement by exploring the linkages with various psychological theories.

Keywords: Teacher professional development, Hybrid gamification, Teacher training, Employee engagement

1 Introduction

In recent years, gamification has gained significant attention in the educational context. Gamification is popular in education due to its ability to efficiently integrate gaming elements in an educational context, leading to engaging learning experiences (Domínguez et al., 2013; Glover, 2013; Muntean, 2011; Stott & Neustaedter, 2013). Several studies have looked at gamification in organizations and its positive effects on their employees (Miri & Macke, 2021; Prasad & Mangipudi, 2021). However, this connection has not been probed in the context of teachers and their engagement. Although studies provide generic models to engage employees at workplace, specific frameworks need to be developed which focus on specific contextual characteristics. It is essential to explore the phenomena in the context of teacher improvement because teachers play a significant role in improving the teaching-learning processes (Hattie, 2012). The literature indicates that even a single teacher can significantly affect students' learning outcomes (Hanushek & Rivkin, 2010). Therefore, like other employees, it would be beneficial to examine if there is a way teachers' effectiveness could be improved using gamification.

Connecting games to education is not a new phenomenon, and often there are misinterpretations tied to gamification. Therefore, it is essential to point out that gamification in education is different from serious games (integrating non-entertainment elements into game environments), simulation games (fragments of the real world are recreated; Landers & Callan, 2011), or edutainment (educational entertainment; Buckingham & Scanlon, 2000). While these phenomena focus on including educational value through games, gamification in education aims to add gaming elements to learning processes and not use a game itself (Glover, 2013).

This paper proposes to implement gamification for teacher professional development (TPD) to enhance teachers' effectiveness. TPD is considered crucial in educational developments to support quality education (Villegas-Reimers, 2003) and establish an effective teaching-learning process (Huang, 2016). It is crucial to have high-quality teacher-training and professional development programs for an effective teaching-learning process (Independent Evaluation Group, 2019).

TPD intends to direct and monitor the advancement of teacher knowledge and expertise to support and bring classroom practice at par with the standards of the 21st-century teaching-learning process. However, regardless of the technological developments, the majority of the professional development programs are still delivered in a short series of direct sessions (Downes et al., 2001). Especially for in-service teachers, providing online training is not the favored method (Jung, 2001). Even when implemented, the traditional e-training does not provide efficient training to teachers (Allela et al., 2019).

Furthermore, the quality of in-service professional development is not up to the mark in many developing countries, and implementation of new curriculum and policies often make it worse (Kidwai et al., 2013). One of the several reasons for this is the low engagement of teachers in their training programs. Burke et al. (2006) argue that in order to improve the outcomes of a training program, it is essential to redesign it in a way that engages the participants better. As gamification leads to better employee engagement (Hamari, 2013; Li et al., 2012), it could be inferred that gamification used in teacher professional development could lead to better program outputs.

Although there exists significant literature on gamification for employees in general, there is a lack of studies focussing specifically on teachers. Teachers who form a significant proportion of the workforce across the world are missing from the literature. There are only a few studies which have explored the way gamification could be used for the professional development of in-service teachers (Newcomb et al., 2019). Therefore, this paper uses gamification for employee training as a reference point for in-service teacher training, which is an underdeveloped area.

The paper attempts to build a theoretical argument that gamification could increase the teachers' engagement in their professional development and further presents a sample hybrid (part online and part in-person) plan to train teachers using gamification on the topic of "assessment." Online part of the training would be asynchronous, that is learners could engage with the learning material as per their convenience. In gamified hybrid training programs, teachers are not passive observers as in regular online training, but they are rewarded, encouraged to compete, and powered with a sense of achievement. The process introduces an element of "fun" and reduces the gap between external and internal motivation. In short, applying game mechanics could make the training program interesting for teachers and enable them to improve their skills organically. This research initiative presents a framework for a gamified hybrid teacher training program by designing an improved and enriched training program for teachers using different elements of gamification.

2 Literature Review and Theoretical Background

2.1 Teacher Professional Development

Converting conventional teacher training programs into online training programs does not mean simplifying the process to the addition of technology or technology equipment to current programs (Delfino & Persico, 2007). The primary purpose of educational technology research is to ensure that teacher training programs deliver the knowledge and proficiency required to identify, choose, and successfully use the educational technology for the teaching-learning process (Wood et al., 2005).

Studies examining how technology can be deployed to improve teacher professional development programs suggest using a hybrid approach, a combination of both conventional and online programs (Prendergast, 2004). The method could be particularly beneficial for in-service teachers (Triggs & John, 2004). The reason is that in-service teachers are independent learners with diverse teaching knowledge, practices, and backgrounds (Shulman, 1986). When provided an opportunity to collaborate with other teachers through a blended/hybrid training program, the results of the whole exercise would be productive (Vonderwell & Turner, 2005). Secondly, interaction with teachers from different schools can encourage social engagement and responsibility. Also, blended programs are comparatively flexible in terms of teachers continuing their training at a suitable time as per their convenience (Henderson, 2007).

Conversely, there are studies specifying that blended courses can be ineffective as teachers' complex, positioned needs could be left unattended (Downes et al., 2001; DeWert et al., 2003; Anderson & Henderson, 2004). Because teacher professional development program involves multidimensional objectives and issues (Henderson, 2007), researchers have argued that in professional development programs, teachers' queries are crucial and need to be addressed rather than just giving mechanistic knowledge (Herrington & Oliver, 2000; DeWert et al., 2003; Anderson & Henderson, 2004). Therefore, there is a need to make a hybrid teacher training program, which is more engaging, motivating, and comprehensive. This paper argues that this can be achieved through gamification.

2.2 Gamification

The word gamification is often used for anything related to 'games.' However, knowing the distinction between games and gamification is essential as games are being used in organizational development for years, whereas employing gamification is a recent phenomenon (Sitzmann, 2011). Researchers have defined gamification in different ways. The widely-used explanation is that gamification is implementing game design elements in non-game contexts (Deterding et al., 2011). Kapp (2012) has defined gamification as "using game-based mechanics, aesthetics, and game thinking to engage people, motivate action, promote learning, and solve problems." On the other hand, Huotari & Hamari (2012) suggest gamification as "a process of enhancing a service with affordances for gameful experiences to support the user's overall value creation." The penultimate definition emphasizes more on the objective of applying gamification than the means to achieve it. The purpose of gamification is to make non-gaming contexts entertaining and engaging, develop motivation among the users, and provide an overall engaging experience (Botra et al., 2014).

Suh et al. (2018) argue that gamification does not lead to engagement through game elements directly; instead, the game-like dynamics created by these elements motivate the participants to engage. Six game dynamics have been identified in the literature - reward, status, achievement, self-expression, competition, and altruism (Bunchball, 2010). The example for each of them is discussed in the training plan.

3 A Gamification System Proposal

The goal of the current training program is to improve teachers' knowledge and skills regarding students' assessment. The completion of the program would improve the ability to plan classroom lessons, teach, and assess students' learning. Similar to student learning, teacher training is also dependent on their engagement. Knowledge cannot be built simply by reading or listening. To successfully motivate teachers to engage with the training program, intellectual, social, as well as affective engagement needs to be induced through the gamification of the program (Soane et al., 2012).

3.1 The Plan

To create effective engagement with the training program, a gamified hybrid professional development program for school teachers has been designed. The vision of the plan is to encourage training among

teachers and increase their engagement. Apart from the behavioural goal to induce engagement, the platform also has instructional goal to successfully impart the knowledge necessary to develop skills for students' assessment.

Before designing the modules, the first step would be an informal meeting with the teachers to be trained. Knowing the target group, their present understanding, and their expectations is always beneficial before implementing the program. A group of education experts is invited to create content for the training, as shown in Table 1.

	Details
Sample Topic	Understanding of Assessment in Classrooms
Aim	To train teachers to use effective assessment methods
Duration	11 weeks
Group	In-service school teachers
Tentative challenges	Teachers have limited time to spare, and the course itself has to be of high educational value.
Specific Objectives	<p>After completing this module, teachers will be able to-</p> <ul style="list-style-type: none"> • Understand the meaning, role, and forms of assessment. • Role of constructivist alignment • Select appropriate methods of assessment according to the nature of the topic. • Design constructivist assessment model for students. • Appreciate the role of feedback. • Acknowledge encouraging peer assessment and self-assessment among students. • Analyze the assessment outputs to assess the quality and improvement in teaching practices.

Table1: Content Example

The course is given a hybrid structure and is stretched for 11 weeks. There are a total of eight modules, four of which are offline. The online sessions are spread over eleven sessions and offline session contains a total of four weeks with face-to-face discussions, feedback, doubt, and assessment sessions. The main topics to be covered through the online modules are given in Figure 1. The other four modules, which are offline, include two discussion modules and two assessment modules.

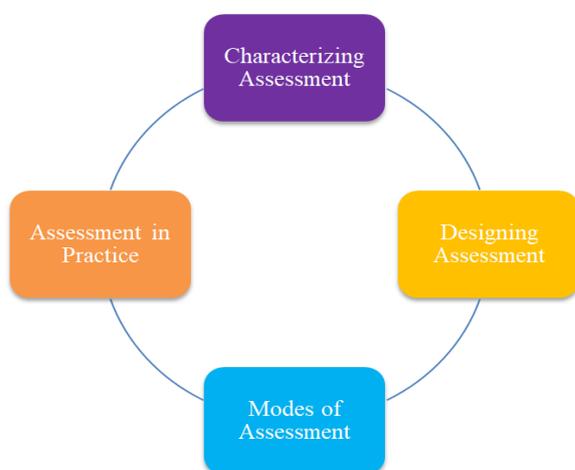


Figure 1: Assessment Modules

Table 2 describes the content and mode of delivery for each module. The first module is about understanding the concept of assessment through its definition and role. The second module deals with the concern of the interface of assessment with learning. Modules 3 and 7 allow participants to discuss their concerns and doubts face-to-face with the instructor. Modules 4 and 8 are about the online assessment of the participants. Module 5 facilitates teachers to learn about modes of assessment like student self-assessment, peer assessment, and discusses the way feedback should be given to students. Finally, Module 6 is about getting acquainted with prevalent evaluation policies in a country and teachers' struggles related to that.

Module	Mode	Module
1	Online	Wide-ranging definitions; assessment as process, assessment as system; misinterpretations, ambiguities, how different from evaluation, test or measurement; roles of assessment; forms of assessment: formal-informal, declarative-procedural, application/information oriented;
2	Online	Assessment of/for/as learning; types of knowledge in classroom; declarative/procedural/schematic/strategic knowledge; Nuffield Curriculum; Use of Teaching-Learning Material for assessment;
3	Offline	Activities to design assessment; different indicators; doubts clarification; feedback about the program;
4	Offline	Assessment of trainees
5	Online	Significance of self-assessment; reliability of self-assessment; peer-assessment; rubrics; role of feedback; how to collect feedback; feedback using rubrics
6	Online	Assessment in evaluation policies; contextual struggles; teacher's agency; nature of topic; subject specific assessment
7	Offline	Doubts discussion; issues of validity; case-methodology; Feedback of the training program;
8	Offline	Evaluation of trainees; creative ideas to design assessment

Table 2: Modules Description

The details of modules, the number of sessions each module and the delivery sequences are detailed in Table 3. In the online sessions, theoretical and methodological knowledge about the assessment will be provided. In the face-to-face interaction, doubts, hands-on activities, and different students' cases will be discussed. The training provides a close integration and balance between the traditional and online training methods. This would be an excellent way to provide an adequate number of chances to discuss, give examples, analyze cases, and go in-depth within the course content, in both online and face-to-face format. In Module 4 and 8, teachers would be assessed based on their creativity to design an assessment on students' cases from some other school or could be asked to develop an assessment plan to assess their progress.

The length of each sessions ranges from 1-2 hours. The short duration allows the teachers to easily access and complete training in their spare time at the school or home. The gamification implementation considers the limitations and counterproductive effects of traditional training methods, allowing teachers to have a sense of accomplishment as they complete the learning program at their own pace while sharing knowledge with other teachers. The complete schedule will incentivise teachers to complete modules and encourage them to interact with different sessions without feeling the burden of time constraints as these sessions will also be available through recordings. The availability of sessions post-completion allows the participants to come back to concepts taught and ensures proper understanding of topics.

Session No.	Module No.	Module Topic	Session Topic
1	1	Characterizing Assessment	Meaning, Ambiguities
2	1	Characterizing Assessment	Role, Forms
3	2	Designing Assessment	Location in Teaching-learning process
4	2	Designing Assessment	Strategies
5	2	Designing Assessment	Use of Teaching material
6	3	Discussion and Doubts	
7	4	Trainee's Assessment	
8	5	Modes of Assessment	Self and Peer Assessment
9	5	Modes of Assessment	Feedback
10	5	Modes of Assessment	Challenges
11	6	Assessment in Practice	Evaluation Policies
12	6	Assessment in Practice	Trainee's practices
13	6	Assessment in Practice	Wrap-up
14	7	Feedback	
15	8	Trainee's Assessment	

Table 3: Session Plans

3.2 The Gamified Platform

The game elements for this plan have been selected to induce all game dynamics identified in this paper. These include reward, status, achievement, self-expression, competition, and altruism (Bunchball, 2010). After identifying the context surrounding this training program, these elements are thought to be better suited for this large group of learners who have limited learning time. The online platform has instances of these elements and dynamics which has discussed in this section.

The game dynamics of reward is induced through awards and trophies. Teachers who pass all levels, i.e., all sessions before the offline modules, receive a gift card. The teacher who will take part in the optional activity after each session wins a trophy. The achievement will be fulfilled through levels, and each session is equivalent to one level. To unlock a particular session, watching all previous sessions is necessary. However, the participants can go back and forth to any of the already watched sessions.

Self-expression is encouraged through badges and profile customization. Teachers can edit information about them, choose an avatar, upload a picture for themselves, and change the wallpaper of the interface. Also, once all requirements have been completed, a module-associated badge will be displayed on their profiles. Competition is persuaded through leaderboard. A leaderboard will be maintained by calculating the scores in quizzes and offline assessment, visible to all participants. Also, the additional platform where teachers can challenge each other is inducing competition. Similarly, status is stimulated through levels, while recognition and altruism through review and feedback, which teachers give each other on their profile or in the discussion portal. These dynamics motivate users to engage with the environment by fulfilling basic desires. Those mentioned above will be collectively added to teachers' digital training programs. Collecting awards on completing a session or module would increase the probability of completing another by motivating them as motivation influences the engagement (Zimmerman & Schunk, 2008). We focus on generating both extrinsic and intrinsic motivations through the gamification implementation (Deci et al., 1999). In our platform, the two types are combined- extrinsic through components such as rewards and points; and intrinsic through components such as achievement and autonomy. (Muntean, 2011). Figure 2 displays a screenshot from the platform.

An online forum is integrated in the platform where teachers can discuss and clarify their doubts among themselves. The forum consists of interactive activities and games where one teacher can design a question or activity to challenge any other teacher. This would give the feeling of co-creators

to the teachers when they can voluntarily apply their subject knowledge and learned knowledge about assessment.

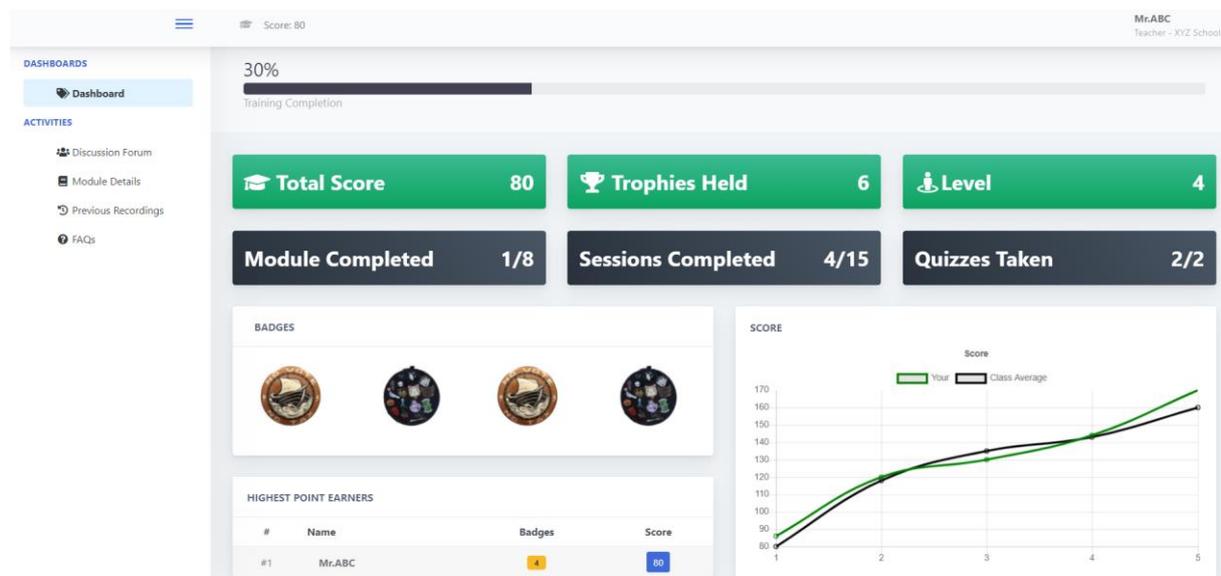


Figure 2: Screenshot of the online platform

4 Theoretical Link between gamification and hybrid training programme

Landers (2014) argues that gamification design is heavily based on the psychological theories of learning. Singh & Verma (2020) show that Self-Determination Theory and Goal-based theories are two of the frequently cited theories. Rest three theories of motivation in psychology are selected as Landers et al. (2015) argue that gamification is an amalgamation of different motivational techniques and their presentation styles. The following section briefly discusses the theories, selected on the basis of extensive literature review on gamification, and their role in the design of our TPD gamified plan.

4.1 Self-Determination Theory (SDT)

According to SDT, a taxonomy of different types of motivation lies on a continuum with amotivation and intrinsic motivation at two extreme ends (Ryan & Deci, 2000). In between, there are different kinds of extrinsic motivation, such as introjection or integration. In the state of amotivation, a person is entirely unmotivated to do a particular task, in this case, the training. The reason could be that the teachers find themselves incompetent for the training program, do not relate to the program, or feel that training would not result in desired outcomes. On successful inducement of the external motivation, the teacher would desire to attend and finish the training to obtain an external reward, such as a promotion, a certificate, or completing job requirements. When the reason for attending a training program for a teacher has an entirely internal locus of causality, the teacher could be labeled as intrinsically motivated. An intrinsically motivated teacher would complete the training with or without any anticipated external returns.

Gamification can be used to influence both extrinsic and intrinsic motivation of trainee-teachers to change their behavior and develop their understanding of the assessment of students. Therefore, the process of gamifying in-service teachers' training could be justified through SDT. Overall, to complete a teacher training program, it is needed that amotivated or less motivated teachers become intrinsically motivated. The theory suggests that external motivation could be a means for this. As the plan mentions, teachers' profiles will display their trophies won by completing modules and tests. These trophies will be extrinsic motivators for the teachers, as teachers might be completing modules only to earn the trophies instead of gaining the knowledge provided by the program.

On the other hand, the process of gamifying the training program also feeds intrinsic motivation. One, the fact that the profile of every teacher is visible to others makes the whole training session consisting of certain social aspects. These social aspects of the whole training program could affect the psychological need for relatedness. Two, completing a module or passing a test or quiz will meet the teachers' need for competence. As teachers can access the online content whenever and wherever they

want, more autonomy than conventional training programs has been added to various tasks to encourage the development of different types of motivation in teachers. In this way, we can see that the gamification of the program can play an essential role in changing teachers' behavior through either extrinsic or intrinsic motivation.

4.2 Goal-Setting Theory

Goal-setting theory suggests that setting goals positively affects the actions by motivating an individual, "directing attention and effort toward goal-relevant activity and away from the goal-irrelevant activity, by energizing effort, and by increasing persistence; goals indirectly affect action through the use of task strategies" (Landers et al., 2015). The theory proposes that the relationship between goals and performances is moderated primarily by four constructs. These are goal-commitment, feedback, task complexity, and situational constraints. First, teachers who would be more committed to the training programs' goals or its task are expected to perform better. The two factors that could affect this commitment are- the significance of goals for the teacher and, teacher's self-efficacy. Second, for goal-setting to be effective, it is important that teachers are given the feedback which allows them to track their own progress towards the goals. Third, effective goal setting is expected to depend on the simplicity of the task. Locke & Latham (2002) argue that the effect of goals becomes dependent on individuals' abilities during complex tasks. Lastly, situational constraints such as lack of time or burdens of other kinds of work affect the goal-performance relationship.

Within goal-setting, gamifying teacher training is mainly done by employing overt signs like badges and the levels. Both indicate the details about the progress of the trainee-teacher. Badges are the computer-generated articles presented to the trainees to complete a particular task, which can also be viewed as a goal, although not always an explicit one. Further, an online feedback portal and offline feedback sessions with teachers have been designed to provide feedback to the trainees. Hamari (2013) has argued that mere badges could not lead to increased performance until combined with the feedback so that learners could watch their own development. Therefore, both badges (goals) and feedback have been combined to motivate teachers in this training plan. Also, 'levels' can be considered as sub-goals within one or more, the larger goal of the gamified system. Setting up simpler and smaller goals could help achieve larger and complex goals (Donovan & Williams, 2003). However, the social aspect is an integral part of gamification (Ling et al., 2005). Therefore, there could be three categories of motivations, focused by different psychological theories - intrinsic, social-based and extrinsic. The example of one theory for each type of motivation is discussed in subsequent sections.

4.3 Self-Efficacy theory

Self-efficacy theory encompasses intrinsic motivation. It indicates the individual's perceived performance ability for a specific activity (Bandura, 1977). Conclusions about self-efficacy are based on four aspects- performance accomplishment, the experience of observing the performance of others, verbal encouragement, and social impacts (Bandura, 1982). These are included in the gamified plan proposed in this paper. Teachers can get immediate feedback about their learning through quizzes after each session. Further, leaderboard, levels, offline discussions, and activities are performance indicators of other participants. Additionally, feedback and review provided by other trainees and tutors during offline discussions provide verbal encouragement. Finally, the desire to be a good teacher or among the top performers are social impacts. In this way, this plan is expected to affect the self-efficacy of the participants.

4.4 The Social Comparison Theory

Social-based motivation is covered by Festinger's (1954) Social Comparison Theory of comparing one's beliefs and achievements with others to move upward. The theory is relevant in the gamification design proposed in this paper. Teachers are constantly provided with opportunities to compare themselves with other teachers through leaderboard, trophies, and badges. Comparing their scores with other participants will motivate teaches to improve their standings to move up the leaderboard.

4.5 Operant conditioning

Skinner's (1963) theory of operant conditioning is a perfect example of extrinsic motivation theory. This reward-based theory claims that positive reinforcers from the environment increase the probability of repeated behavior, and undesirable behaviors are discouraged through punishments. The focus would be on ensuring that the teachers achieve the intended learning outcomes, as the idea is to reinforce behaviors that contribute towards achieving these outcomes positively. In the plan, the trophies, gift cards, badges after completing the modules and quiz scores are positive reinforcers.

5 Conclusion

The literature suggests that there is an urgent need to improve the teacher professional development programs (Allela et al., 2019). No matter how much the quality of professional development programs is improved, it will not show desired results until teachers engage in the learning process. As established in other organizations, it is argued that implementing gamification will enhance teachers' engagement in their hybrid training program. Further, the paper presented a sample plan to train teachers using gamification. The plan proposed in this paper is substantiated by linking it with the previous studies and psychological theories. The next step of the research is to examine the conceptual argument presented in this paper through empirical data collected using the same sample plan.

The gamified in-service teacher training program is an important input while designing an effective model for teacher professional development. Teachers who are among the primary stakeholders of school education must be trained well. Gamification can positively impact the two factors during teacher training- teacher motivation and teacher engagement. The gamified hybrid teacher-training programs will facilitate the schools to make use of the teachers' knowledge to increase the quality of education. The gamified teacher training program could transform the professional development process of teachers.

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