# Exploring indicators of engagement: applications for gamification of online training systems

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## ABSTRACT

In recent years, gamification is being used in business organization for an increased employee engagement in the work place. However, less has been said about engagement of employees in online training to learn new skills and knowledge that may help or improve status quo in the organization. This paper explores the engagement indicators and game elements that may foster employee engagement in online training. The study employs an iterative step-by-step methodology that is used in information technology for the development of artefacts. As a result, a framework to implement the gamification technique in online training is proposed. The framework consists of a gamification construct that contains a set of commonly used game elements such as points, levels, challenges, rewards, competition, progress bar, leaderboard, badges, and feedback. The framework also contains three engagement dimensions including behavioural, emotional, and cognitive dimensions. To achieve the main objective of the study, an iterative process used by information technology researchers to develop new artefacts and their constructs is employed. As for the formulation of the hypothesis, for the evaluation of gamification's influence on employee engagement when attending an online training, Technology Acceptance Model (TAM) is employed.

| **Keywords**: | online training; gamification; game elements; engagement; employee |
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## 1.    Introduction

Today, there is an unprecedented change in the nature of work and an increased diversity of workforce in the corporate environment. Employee engagement plays a pivotal role in impacting revenues, innovation, and organization effectiveness. Employee engagement is the level of commitment and involvement of an employee towards the organizational values of an entity [1]. To remain competitive, human resource departments of companies establish agendas for employee engagement. Training is an important part which contributes to employee engagement. Through training, employees can learn new skills that may trigger an interest in their jobs. Business organizations are adapting boundary-less strategies in their environments. Consequently, online training has become the trend [2]. Nevertheless, lack of engagement in the corporate online training environment has been reported in several studies [3]. Gamification, the employment of game elements in a non-game context, has become a trend for improving employee engagement. For instance, gamification-based engagement has been investigated in areas of innovation, training and education, employee performance appraisal, and production [4] in business organizations. Apart from these areas of focus, the gamification of online training has been identified as a positive contributor to improve employee engagement. Hence, it has become an area of focus for researchers. However, few studies have explored the gamification of corporate online training systems [5]. There is a lack of an imperial study that provides scientific gamification strategies to improve employee engagement in online training. The present study thus aims to investigate, identify, and test game elements that can be employed in online training systems to engage employees in learning essential skills and knowledge provided in the training. The use of gamification as a means of defining employee engagement in online training environments is studied in terms of the concepts of self-efficacy, flow, motivation, and presence [3]. Besides, researchers have taken different approaches towards examining how engagement is experienced by the employee and have measured and

interpreted it in gamified online training systems [6, 7]. In this study, employee engagement is narrowed down to the scope of its theoretical and practical importance and its application in areas of gamified online training. An engagement framework was developed that defined three dimensions of engagement including behavioural, emotional, and cognitive engagement, as well as their indicators. Besides, the framework included a set of commonly used game elements defined through literature analysis. To explore the influence of gamification on employee engagement in online training, the Technology Acceptance Model (TAM) was employed. Hence, the hypothesis needed to evaluate the framework is shown in the framework. The rest of the paper is organised as follows. Section II discusses background and related work. Section III presents the methodology. Section IV identifies the game elements that will constitute the framework. Section V presents the engagement framework, and Section VI concludes the paper.

## 2. Background and related work

### 2.1. Engagement theory and dimensions

Employee engagement is a well-researched area that includes studies involving commitment, satisfaction, loyalty, and willingness of doing extra role behaviour. Engagement is the emotional and intellectual commitment that one exerts towards achieving something, and is measured by how hard employee works and how long he/she stays as a result of that commitment [8]. In the context of learning, researchers proposed different engagement theories for their respective studies. For instance, for engaging an employee in online training to learn new skills and knowledge, in [9], the researchers defined engagement that involves web applications as 'the emotional, cognitive, and behavioural connection that exists, at any point in time and possibly overtime, between a user and a resource'. The definition directly reflects three engagement dimensions. Similarly, the researchers in the field of education concluded that engagement consists of behavioural (participation, positive conduct, effort), emotional (interest, positive emotions), and cognitive (psychological involvement in the learning, self-regulation) dimensions. Besides, based on the objectives of the present study, the definition of trainee engagement has to be related to gamified online training or learning systems. In this aspect, Bouvier et al. [10], in the context of game-based learning, defined engagement as 'the willingness to have emotions, affect, and thoughts directed towards and aroused by the mediated activity in order to achieve a specific objective'. According to Bouvier et al., this definition is abstract or generic and is not context based. Thus, it only focuses on the state of engagement and does not mention dimensions or factors of engagement. For more investigation, the engagement frameworks adopted in the gamification of learning platforms is examined in the present study. In[11, 12], the researchers proposed an engagement framework based on serious games with computer-based learning. The framework resulted from a qualitative research that explores the engagement factors of digital games among learners of mathematics. The factors are grouped under three engagement levels including initial, ongoing, and engagement outcome. The initial engagement consists of clarity and thematic factors. The ongoing engagement has rewards and feedback, social interaction, creativity, and challenge factors. Further, the outcome engagement has immersion as a factor. An engagement framework for gamification of learning is proposed in [13]. The framework sketches the relationships between game elements, dimensions of engagement, and learning outcomes as well as sheds light on the task and user-related factors that may impact the effect of gamification on learner's engagement. In the framework, the engagement dimensions include behavioural (time on task, number of attempts, efforts), emotional (valence and arousal, endurability), and cognitive (focused attention, reflection). Similarly, researchers in [14] studied engagement in association with media enjoyment using a tripartite engagement model involving affective, cognitive, and behavioural dimensions. There are several other studies that have contributed engagement frameworks composed of emotional, cognitive, and behavioural dimensions. Nevertheless, engagement indicators used in each of the studies are different[15, 16]. Cognitive engagement is the active process of learning. It is related to what students do and think to promote learning [2]. This type of engagement is the most fundamental form of engagement. It focuses on the learner's psychological investment in learning. The strategies students use for cognitive engagement, such as critical thinking, metacognition, integration, and justification, are multi-disciplinary and can be used in any learning situation [17]. Behavioural Engagement concerns participation and involvement and is often measured by attendance, time spent, and the number of attempts [13, 18]. They described behavioural engagement as 'doing the work and following the rules'. Students who are behaviourally engaged 'are characterized by [their] positive conduct, class participation, involvement in the learning task, high effort and persistence, positive attitudes, and self-regulation of their learning' [19]. Emotional engagement refers to students' emotional reaction to learning. It

is related to their feelings or attitudes towards learning. Students' emotional engagement can be observed through their attitude, enthusiasm, interest, anxiety, or enjoyment in the learning process [2].

## 2.2. Gamification

Gamification is used for increasing engagement between humans and computers [20]. Gamification can help to achieve a number of broad business objectives, including change behaviour, e.g., companies can use gamification to improve employee engagement in new business processes; develop skills, as gamification is increasingly being used in both formal education and in corporate training programs to engage users in a more immersive learning experience; enable innovation, as gamification structure can provide the goals, rules, and tools for users to explore, experiment, collaborate, and solve problems[21, 22]. Hence, related studies suggest that gamification can serve as a useful tool for employee engagement[19]. In the present study, the main goal of gamifying online training platforms is to engage users in a more immersive learning experience. That is, using gamification in online training platforms will transform trainees from observers into active participants who can easily absorb and recall information provided in the training. The study aims to offer a new theoretical engagement framework to guide developers in the process of gamification implementation and design in online training systems. The following section discusses the methodology used to achieve the research aim.

## 3. Methodology

The step-by-step process used in the field of information technology [23-25] is employed to explore suitable game elements that can be used to develop an engagement framework based on the gamification of online training. The steps taken throughout the process, as shown in figure 1, includes identification of a set of framework from the gamification of learning (e-learning, online learning, and online training) systems. Subsequently, a set of requirements that must be fulfilled by the framework proposed in the study are identified. To that end, the frameworks are evaluated against the requirement to shortlist the frameworks that will best help the development of the framework.
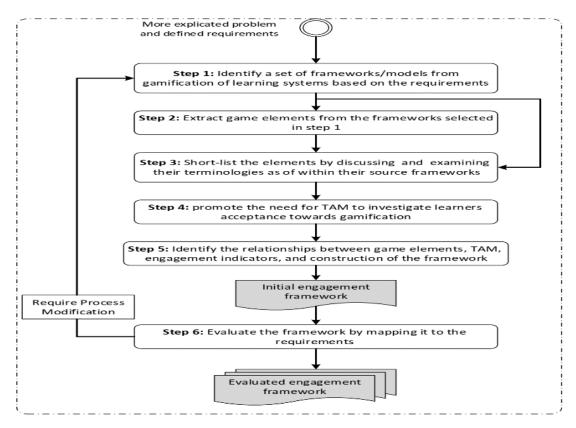


Figure 1. Framework development process

Once the final list of the frameworks is prepared, the game elements proposed in each of the frameworks are extracted and their usage in the field of gamification is studied. The relationships between the elements and their designations in their respective framework are then studied. Consequently, by reducing the number of elements extracted for the frameworks, most common game elements used for the engagement of user in a gamified online training systems are selected. Finally, based on the identified common elements, the initial version of an engagement framework is designed and evaluated as per the proposed requirements.

## 4. Identifying common game elements

To prepare the knowledge source, an initial domain study and gamification framework collection is conducted. A primary collection of frameworks pertaining to the gamification of learning systems, as shown in Table II, have been thoroughly studied. The frameworks are referred by researchers in the domain of gamification of learning systems. The framework proposed in this study improves user engagement through gamified online training systems and should meet the following requirements:

- **Clarity of goal**: Gamification engages students to achieve certain goals. Thus, goals that have to be achieved when employing gamification in online training must be clear and set beforehand [26-28].
- **Autonomy/creativity:** Corresponds to the ability of the employee to study at home or in the workplace independently and make decisions without requiring continuous intervention from the trainer [29].
- **Execution of activities:** Online training systems that incorporate game elements should identify when the trainee has completed all learning activities [29, 30].
- **Social interaction:** A gamified online training system should be able to identify when the trainee has a good relationship with the colleagues and trainer [31, 32].
- **Delivery:** A gamified training system has to provide options where activities are not accomplished by doing tasks, but by delivering tasks between deadlines (such as assignments) [33, 34].
- **Thinking skills:** A gamified online training helps trainees engage critical thinking skills to solve problems and overcome challenges they face in the process of learning [31].
- **Questioning/interested:** A gamified online training system will help trainees to not feel intimidated or embarrassed to ask the trainer about the studied subjects [30].
- **Feedback:** A gamified online training platform that provides instant feedback to its users will help trainers improve continuously by, for example, learning from their previous mistakes [31].
- **Fun:** The trainee performs activities not only as an obligation but also because they consider them fun. Thus, a gamified training platform attracts trainees to engage in learning activities and keep coming back for more [30].
- **Cognitive Skills:** A gamified online training platform should draw trainee to focus on mental investment by thoughtfully exerting the efforts necessary to comprehend complex ideas and master difficult skills [35, 36].

The 24 frameworks in Table II are now evaluated against the requirements. That is, to fit among the constituting frameworks, a framework is assessed for how much it satisfies the requirements. Any framework evaluated under this requirement coverage assessment that does not cover at least 50% of the requirements is not included in the constituting set of frameworks. Thus, it is verified whether the framework explicitly mentions the requirement or discusses it in one way or another. The summary of the assessment is provided in Table III. Among the 24 frameworks, only 10 frameworks have met the assessment and used in the following steps of the design and development process (step 1). The selected frameworks are listed in Table IV. Subsequently, all the game elements illustrated in the 10 frameworks were extracted. A total of 54 game elements were extracted from the 10 frameworks through the analysis of step 1. During the process of extraction, it was observed that researchers used certain game elements that have the same descriptions but were given different names in different frameworks (Step 2).

Therefore, to remove elements with similar meaning, the description of an element in one framework was compared with the descriptions of the elements given in the other frameworks. Subsequently, elements found to have similar descriptions were removed from the list of elements. Following steps were taken to reduce such elements:

a) Identify element with highest recurrence frequency.

b) Identify framework that does not contain the elements with the highest occurrence, and then study descriptions of its elements for similarity to highest recurring element.

c) If an element with similar description to the highest recurring element is identified, remove it from the list.

Table 1. Summary of reviewed frameworks

| Surces | Titles | Year |
|---|---|---|
| [37] | Effectiveness of gamification in the engagement of students | 2016 |
| [38] | Social network analysis of a gamified e-learning course: Small-world phenomenon and network metrics as predictors of academic performance | 2016 |
| [39] | Framework for gamification based E-learning systems for higher education in Egypt | 2017 |
| [15] | The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system | 2020 |
| [40] | Gamification and Game Mechanics-Based e-Learning: A Moodle Implementation and Its Effect on User Engagement | 2017 |
| [13] | Developing a Comprehensive Engagement Framework of Gamification for Reflective Learning | 2016 |
| [41] | Gamification in e-learning systems: A conceptual model to engage students and its application in an adaptive e-learning system | 2015 |
| [34] | Using game elements to increase student engagement in course assignments | 2016 |
| [42] | Gamification design framework based on SDT for student motivation | 2015 |
| [43] | Gamification Framework Model, Based on Social Engagement in E-Learning 2.0 | 2014 |
| [32] | Gamification in E-Learning: Introducing Gamified Design Elements into E-Learning Systems | 2015 |
| [41] | Gamification in e-Learning Systems: A Conceptual Model to Engage Students and Its Application in an Adaptive e-Learning System | 2015 |
| [44] | A gamified peer assessment model for online-learning environments in a competitive context | 2016 |
| [45] | A gamified e-learning design model to promote and improve learning | 2016 |
| [46] | Gamification and student motivation: Interactive Learning Environments | 2016 |
| [47] | Design and evaluation of a gamified system for ERP training | 2016 |
| [48] | An architecture of a gamified learning management system | 2014 |
| [49] | Visualisation and gamification of e-learning and programming education | 2015 |
| [50] | The Contribution of Gamification on User Engagement in Fully Online Course | 2015 |
| [51] | Gamification Framework for Designing Online Training and Collaborative Working System in Statistics Indonesia | 2016 |
| [52] | Improving learning experiences through gamification: A case study | 2015 |
| [5] | Gamification of employee training and development | 2018 |
| [36] | An exploratory study of student engagement in gamified online discussions | 2018 |
| [53] | Students' Evidential Increase in Learning Using Gamified Learning Environment | 2018 |

d) If no element with similar description is identified, retain the element in the list.

e) Repeat the steps to examine all element descriptions.

For example, some of the frameworks use progress bar as an element while some use progression. The two elements have the same descriptions in their respective frameworks. The most recurring or the one used in most frameworks is the progress bar. Hence, based on the descriptions, the two elements are disjointed from each other. A set formula has been utilised to demonstrate the abovementioned reduction process:

*If*

$\alpha$ and $\beta$ are two sets of frameworks.

Progress bar ∈ α; and Progression ∈ β
then α \ β, therefore Progress bar ≡ Progression.

Table 2. Summary of the assessment against the requirements

| Frameworks | Clarity of goal | Autonomy | Execution | Social interaction | Delivery | Thinking skills | Questioning | Feedback | Fun | Cognitive Skills |
|---|---|---|---|---|---|---|---|---|---|---|
| [37] | | • | • | • | • | • | • | | • | |
| [38] | • | | | | | | | | | • |
| [39] | • | • | | | | | | | | |
| [15] | • | • | | • | | | • | • | • | • |
| [40] | | | | • | | | • | | | • |
| [13] | • | • | • | | • | | • | • | • | • |
| [41] | • | • | | | • | | • | • | | |
| [34] | | | | | | • | | | | |
| [42] | | • | • | • | • | • | • | • | • | |
| [43] | | | | • | • | • | | • | | • |
| [32] | | • | | • | • | | | | • | • |
| [41] | | | | | | • | | • | • | • |
| [44] | | | | | • | • | | | | |
| [45] | • | • | | • | • | • | • | • | | • |
| [46] | • | | | | | • | | • | | |
| [47] | • | • | | • | | • | | | | |
| [48] | | | | • | • | • | • | • | • | • |
| [49] | | | | | | • | | • | • | • |
| [50] | • | • | • | • | | • | | • | | • |
| [51] | | | | • | | • | | | • | |
| [52] | | | | | | | | • | | |
| [5] | | • | | • | | • | | | | • |
| [36] | | | | • | | • | | | | |
| [53] | | | • | | • | • | | • | • | • |

Since Progress bar appears in most frameworks, it was retained in the list and removed progression. The listing of the 54 elements was reduced and the elements commonly used in the gamification of learning system for the engagement of users were identified, as shown in Table 4.

Table 3.  Selected frameworks

| Sources | Titles | Year |
|---|---|---|
| [37] | Effectiveness of gamification in the engagement of students | 2016 |
| [15] | The role of gamified e-quizzes on student learning and engagement: An interactive gamification solution for a formative assessment system | 2020 |
| [13] | Developing a Comprehensive Engagement Framework of Gamification for Reflective Learning | 2016 |
| [42] | Gamification design framework based on SDT for student motivation | 2015 |
| [43] | Gamification Framework Model, Based on Social Engagement in E-Learning 2.0 | 2014 |
| [32] | Gamification in E-Learning: Introducing Gamified Design Elements into E-Learning Systems | 2015 |
| [45] | A gamified e-learning design model to promote and improve learning | 2016 |
| [48] | An architecture of a gamified learning management system | 2014 |
| [50] | The Contribution of Gamification on User Engagement in Fully Online Course | 2015 |
| [53] | Students' Evidential Increase in Learning Using Gamified Learning Environment | 2018 |

Table 4. Selected common game elements

| Elements | Selected Frameworks | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | [37] | [15] | [13] | [42] | [43] | [32] | [45] | [48] | [50] | [53] |
| Points | • | • | • | • | | • | • | • | • | • |
| Levels | • | • | • | • | | • | • | • | • | • |
| Challenges | • | • | • | • | • | • | • | • | | |
| Rewards | | • | • | | • | | | • | • | |
| Competition | • | • | • | • | | | • | • | • | |
| Progress bar | | | • | • | | • | | • | • | |
| Leaderboard | | | • | • | | • | • | • | • | • |
| Badges | | | • | | | • | • | • | • | • |
| Feedback | | • | • | | | | | • | • | |

According to Table V, it can be concluded that none of the constituting frameworks could satisfy all the extracted game elements. Hence, the most common elements identified to develop the framework are points, levels, challenges, rewards, competition, progress bar, leaderboard, badges, and feedback (Step 3).

## 5. Engagement framework

Section II identified the engagement dimensions and their associated indicators and Section IV presented a selection of the most common game elements used to ensure user engagement in gamified online learning systems. This section proposes the new engagement framework. Technology Acceptance Model (TAM). TAM is an information employed to investigate the user's decision of acceptance and use of a new technology [54]. The framework was developed in this study to investigate learner's acceptance of gamification and its effects on the learner's engagement rate in an online training system. This framework, as shown Fig. 1, is designed based on the TAM with the exclusion of Behavioural Intention (BI) and Actual System Usage (U) constructs. The framework

advocates that Gamification Perceived Usefulness (GPU), which is also predisposed by Gamification Ease of Use (GEOU), and GEOU are the two factors that affect the learners' attitudes towards gamification. GPU can be defined as the degree to which the learners' beliefs about using gamification will enhance their engagement in learning, whereas GEOU refers to the degree to which the learners expect the gamification to be free of effort. The framework demonstrated that a learner's attitude regarding gamification will influence their engagement, either in terms of skills or participation/interaction in the online training system. Learners are more prone to accept gamification if they perceive that gamification is easy to use and useful in their learning. At the same time, learners will become more engaged during online training (Step 4 & Step 5).
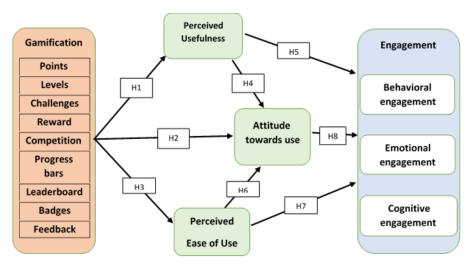


Figure 2. Engagement framework for gamifying online-training platforms

Game elements

**H1:** Perceived usefulness (PU) is directly influenced by gamification elements.
**H2:** Game elements and attitude towards the benefit of using (ATU) online training are positively correlated.
**H3:** Game elements have direct, significant, and positive influence on perceived ease of use (PEOU).
Perceived usefulness
**H4:** There is a direct, significant, and positive relationship between perceived usefulness (PU) and attitude towards the benefit (ATU) of using gamified online training.
**H5:** There is a direct, significant, and positive influence of perceived usefulness (PU) on the engagement (behavioural, emotional, and cognitive engagement) when using gamified online training.
Perceived Ease of use
**H6:** There is a direct significant influence of perceived ease of use (PEOU) on attitude towards the benefit of using (ATU) gamified online training.
**H7:** There is a direct positive relationship between perceived ease of use (PEOU) and engagement (behavioural, emotional, and cognitive engagement) in using gamified online training.
Attitude and engagement to use
**H8:** Users' attitude towards the benefit of using gamified online training (ATU) is positively related to the engagement (behavioural, emotional, and cognitive engagement) in using gamified online training**.**


## 6. Conclusion

Few studies have examined gamification in online training systems in the domain of employee engagement. Only few researches have tried to improve employee engagement in online training through gamification. The aim of the present paper was to foster employee engagement in online training using a gamification technique. The study discussed engagement dimensions reported in the literature of gamification. These dimensions include behavioural, emotional, and cognitive engagement. Subsequently, the factors under such engagement dimensions that may be influenced by the employment of gamification in online training were identified. This

led to using an iterative method to develop an engagement framework. When developing the framework, some existing online learning gamification frameworks were also studied. Consequently, a set of requirements that must be fulfilled to develop engagement frameworks concerning the gamification of online training were identified. To study weakness in the reviewed gamification frameworks, the requirements were mapped to the frameworks and thus a set of suitable online learning gamification frameworks were identified that could be used to develop the framework. Subsequently, the three engagement dimensions and their associated indicators were employed for the development of the framework. TAM was also adopted to form the hypothesis to be tested for the evaluation of the framework. It should be noted the evaluation of the framework was not included in this study.

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