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# Psychological Factors Influencing the Effects of Gamification on Training Outcomes: A Systematic Literature Review

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### **Abstract**

While much research has been devoted to examining which game elements can be utilized to increase the effectiveness of organizational training, little is known about the mediating and moderating effects that influence this relationship. This systematic literature review investigates the influence of motivational variables and attitudes on outcomes of gamified organizational training. The review followed the PRISMA guidelines for conducting literature reviews and yielded 15 articles from several databases. Several motivational variables were found to directly impact training outcomes, with flow and efficacy perceptions being identified as mediating factors for some of these motivational variables. Attitudes toward gamified training were not found to be a moderator, however, there is weak evidence suggesting that motivation might mediate the relationship between attitudes and training outcomes. Based on the results of this review a framework has been proposed, and limitations and directions for future research are discussed.

*Keywords:* gamification, organizational training, flow, expectancy perceptions, perceived usability, attitudes

### **Psychological Factors Influencing the Effects of Gamification on Training Outcomes: A Systematic Literature Review**

In recent years, there has been a growing scientific interest in the concept of gamification. Gamification is most commonly defined as the implementation of game elements in non-game contexts (Deterding et al., 2011). While a large proportion of research output focuses on gamification in the education sector, gamification has also been applied to various human resource management (HRM) functions (Georgiou et al., 2019; Murawski, 2020), including organizational training (Baxter et al., 2016). It is important to note that gamification is distinct from serious games (also referred to as game-based learning), which are stand-alone games designed for non-entertainment purposes (Charsky, 2010). Gamification, on the other hand, describes the process of adding game elements to existing training interventions (i.e. a non-game context). While serious games have a long tradition in the context of organizational training, gamification is a more recent trend in research (Larson, 2019) as researchers and organizations are looking to utilize the affordances of gamification at a relatively lower implementation cost than serious games (Brull & Finlayson, 2016; Hamari et al., 2014).

While there are many uses for gamification within an organization (Larson, 2019), organizational training is an area within the corporate environment that lends itself especially to this application. Organizational training aims to create lasting and meaningful behavioral change that is beneficial to the organization (Landers, 2019). Continuous development and training are considered to be essential to stay competitive, and successful organizations are thought to spend more resources on training initiatives (Salas & Cannon-Bowers, 2001). The effectiveness of training can be evaluated by considering different theoretical frameworks. The four-level framework proposed by Kirkpatrick (1976) suggests that an evaluation of the training should be conducted at four progressive levels (reaction, learning, behavior, and results). Kraiger et al.

(1993) proposed a three-component model of learning which argues that a multidimensional perspective represents learning better than a progressive unidimensional perspective as proposed by Kirkpatrick. Kraiger et al. (1993) proposed three dimensions of learning outcomes: cognitive, skill-based, and affective outcomes. Cognitive learning outcomes are defined as knowledge acquisition and -orientation, as well as cognitive strategies that can be employed; skill-based outcomes refer to technical or motor skills relevant to a certain job, and affective outcomes include employee attitudes and motivational tendencies. It has been suggested that affective outcomes represent long-term learning the best, while cognitive and skill-based training outcomes are more immediate and directly measurable (Hauenstein, 1998). It has, therefore, been theorized that by examining attitudes and motivation of employees long-term learning can be measured (Uslu et al., 2022). This review will follow this conclusion and focus on motivational and attitudinal factors because the main goal of organizational training is to produce a long-lasting change as previously stated.

However, while employee training has been found to be positively associated with organizational effectiveness (Aguinis & Kraiger, 2009), it often fails to meet expectations, and its effectiveness is often not well established (Bell & Moore, 2018). Training programs may be perceived as being boring, and not relevant to everyday tasks by employees, while organizations criticize a lack of transferring knowledge to the job, and high implementation costs (Caudron, 2002; Kraiger et al., 2004). Gamification is a tool that can be used to counter this effect and to improve training outcomes as it is thought to create engaging learning environments by making use of elements and mechanics typically found in games (Kapp, 2012). Understanding the process of how the implementation of gamification influences affective training outcomes and how they consequently influence other training outcomes is often neglected in the literature, but

it is nevertheless a very important consideration that influences the effectiveness of gamified training programs (Helmefalk, 2019; Landers, 2019).

### **Relevant Literature**

There seems to be a consensus in the literature that gamification is a useful tool to improve training effectiveness in organizations (Armstrong & Landers, 2017, Werbach & Hunter, 2012; Zichermann & Cunningham, 2011). For example, it has been found that the process of adding game mechanics and game elements to training programs has the potential to promote learning, engage trainees, foster problem solving, and motivate action when implemented correctly (Kapp, 2012). However, research is still lacking a clear understanding of what makes gamified training effective. While many researchers focus on which game elements are most effective for increasing motivation and engagement (i.e. affective training outcomes), this likely leads to missing out on understanding the complex interaction of factors that lead an individual receiving gamified training to have improved training outcomes. Behavioral change is a complex process that is not always maintained, especially if transferred to new contexts (Heino et al., 2021). To achieve lasting effects of gamified training, therefore, it is important to understand the complex relationship between gamified training input (i.e. the gamified training design) and training outcomes, as well as factors that possibly mediate or moderate this relationship and to address these factors in the development of gamified training initiatives.

Research on gamification across contexts recognizes gamification as a process that occurs in three sequential stages (Helmefalk, 2019): game mechanics (e.g. decisions, rules, and aesthetics), psychological processes that mediate various relationships, and psychological or behavioral outcomes. To illustrate this process, Helmefalk uses the example of a marketer whose goal is to increase sales. In this context, gamified marketing (i.e. game mechanics) should evoke

positive emotions in the consumer to consequently motivate a purchase (outcome). Similarly, in the context of organizational training, Landers (2019) argues that only through understanding how game elements are psychologically experienced can the full potential of gamification be achieved. While motivation and attitude are defined as (affective) training outcomes by Kraiger (1993), it can be argued that the attitudes an employee holds about the training and the motivation induced by game mechanics (partially) make up a trainee's psychological experience which then should influence other training outcomes (i.e. skill-based and cognitive outcomes). Therefore, affective training outcomes such as attitudes and motivational variables should mediate the relationship between game mechanics and training outcomes, such as knowledge acquisition and skill improvement.

While previous research has examined motivational and attitudinal variables and recognized them as mediating variables that are influencing training outcomes, there is little research investigating which game mechanics influence which psychological mediators and how those mediators consequently influence training outcomes in organizational contexts (Helmefalk, 2019). This systematic review aims to address this gap in research by synthesizing evidence from multiple research articles to provide a clearer picture of these relationships. One example of a motivational variable that has been found to mediate learning outcomes is flow (Kiili, 2005; Liao, 2006). Flow is defined as a positive and desirable state in which people are completely immersed and intensively engaged in the actions that they are performing (Csikszentmihalyi & LeFevre, 1989) and is thought to positively affect behavioral intentions such as continuance intentions (Kim, 2021). Continuance intention refers to the degree to which a trainee is willing to use a program or service again or recommend it to others (McDougall & Levesque, 2000). In the training context, this could translate to the adoption of certain procedures or transference of

knowledge to everyday work (Kim, 2021). Research across different contexts has established that those behavioral intentions are a good predictor of future behavior (Ajzen, 1991; Davis et al., 1989; Legris et al., 2003), therefore the experience of a flow state should adequately predict employees' future behavior. Csikszentmihalyi (1990) proposes that finding the right level of challenge indirectly influences learning outcomes through inducing flow which then consequently leads to improved performance. Therefore, training designs that introduce enough challenge by making tasks difficult but not unsolvable, should positively influence training outcomes by inducing a flow experience.

Employees' attitudes are another variable that is thought to influence the relationship between game mechanisms and training outcomes (Landers & Armstrong, 2017). Landers (2015) concludes that there are two causal pathways through which gamification affects learning outcomes. He proposes that learning-related attitudes influence learning either by strengthening the relationship between instructional design quality and learning outcomes (i.e. a moderating process) and/or by directly influencing learning (i.e. a mediating process). In the context of organizational training, it has been found that employees' computer attitude (i.e. the attitude towards computers and the use of computers) has a positive direct influence on both flow experience and learning outcomes (Ho & Kuo, 2010). Game elements were also found to have a causal relationship with service usage intention mediated by a user's attitude (Kim, 2021). If the user perceives the service as enjoyable and convenient, this positively affects the user's attitude and usage intention (Ha et al., 2007; Lin & Bhattacharjee, 2010). Similar predictions are also made by the theory of gamified learning. This theory proposes that a learner's attitude can directly impact learning outcomes and that the application of game elements impacts a learner's attitude (Arthur et al., 2003; Seidel & Shavelson, 2007). Therefore, it seems that the attitudes that



an employee holds about gamified training or training technologies may also mediate the relationship between gamified training and training outcomes. These findings provide support for the assumption that affective outcomes of gamified training (i.e. motivational and attitudinal variables) result from gamification and in turn influence other training outcomes such as knowledge acquisition and skill development.

### **Research Objective**

To further the theoretical understanding of how psychological factors contribute to the effectiveness of gamified organizational training, this paper aims to provide a systematic review of the current state of the literature on the application of gamification to organizational training. The focus of this research is on the influence of motivational factors and attitudes toward gamified training on training outcomes. Motivational factors are those variables that are identified based on motivational theories and are proposed to increase employee motivation. The research question examined in this review is: “How is the influence of motivational factors and attitudes on the outcomes of gamified organizational training interventions portrayed in the current literature?” To answer this question, this review will focus on which motivational or attitudinal variables are discussed in the literature (e.g. flow, attitudes toward gamified training, attitudes toward technology, etc.), and how they relate to game elements and training outcomes (i.e. whether the psychological variables are measured as outcomes or whether they have a mediating or moderating effect on the relationship between gamified training design and training outcomes). Psychological variables that influence the relationship between game design and training outcomes are of particular interest because they offer insight into the process through which gamification has its effect and thus contribute most to answering the research question. This review may serve as a foundation for practitioners to reference when designing training

initiatives aiming to maximize training success. Additionally, it may direct further research by uncovering areas where more research is still needed to fully understand how gamification affects employees' training outcomes.

## **Method**

### **Search Strategy**

This paper aims to evaluate the state of literature on psychological variables influencing the process of gamification in organizational training contexts. For this purpose, a systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines as outlined by Page et al. (2021). PRISMA consists of a list of 27 items that must be included in a systematic review to ensure transparency of each step of the review process. Using the PRISMA framework ensures the systematic review makes a valuable contribution to research by asking authors to prepare an accurate, complete, and transparent account of why the review was performed, the process of literature compilation and selection, and the results found (Page et al., 2021). Not all items of the checklist apply to this review due to the nature of this research being a master thesis project (see Appendix A for which items apply).

Various databases, including EBSCOHost, Science Direct, Web of Science, and Scopus were used to find relevant literature. These databases were chosen because they contain a large number of full-text articles in the area of organizational psychology and offer the possibility to apply filters to automate the search. Inclusion and exclusion criteria were decided based on theoretical relevance, not based on any specific framework (c.f. Table 1 for the complete list of inclusion and exclusion criteria). To ensure a high quality of the literature included in the review, only peer-reviewed journal articles were included. Contributions from books and grey literature

(publications without peer review, and literature not traditionally published, such as conference proceedings and dissertations), as well as contributions in languages other than English, were excluded. Because the topic of interest is gamification in organizational training, only research conducted in organizational settings yields evidence that leads to useful conclusions about the applicability of gamification. Therefore, while studies conducted in (secondary) educational settings might contribute to the overall understanding of gamification of training, they cannot give insight into the variables affecting gamification that might be specific to organizational settings and were thus excluded.

**Table 1**

*Inclusion and Exclusion Criteria for the Literature Search*

Criteria	Inclusion	Exclusion
Results of the literature search	Boolean search string: gamif* AND training AND organization OR work*	Other
Language	English	Other
Literature	Articles published in peer-reviewed articles	Book chapters, grey literature, conference proceedings
Study Type	Qualitative and quantitative studies	Reviews and secondary analysis
Population	Employees, managers, or other personnel working in an organization	(University) Students
Investigation Object	Psychological factors influencing outcomes of gamified training	Serious games
Context	Organizational training	Education, other

**Literature Search and Screening Process**

Boolean search terms were used to perform automated searches in the selected databases.

The following search string was entered into each database: “gamif\* AND training AND

organization OR work\*”’. Using the terms gamif\* and work\* ensured that all possible nouns, verbs, and adjectives that could be derived from the roots, such as gamification, gamified, gamify, workplace, worker, and working were considered in the search. To automate the search further the results were filtered for peer-reviewed articles, English language, and articles published in academic journals. As recommended by Siddaway et al. (2019) the inclusion and exclusion criteria were revisited and adapted during each stage of the screening process, as certain criteria may become only apparent until researchers get more familiar with the literature. It was decided that in some cases research conducted in healthcare contexts was eligible for inclusion. For example, doctors or nurses receiving training to learn new techniques or skills relevant to their job were decided to fit the criteria of occupational training.

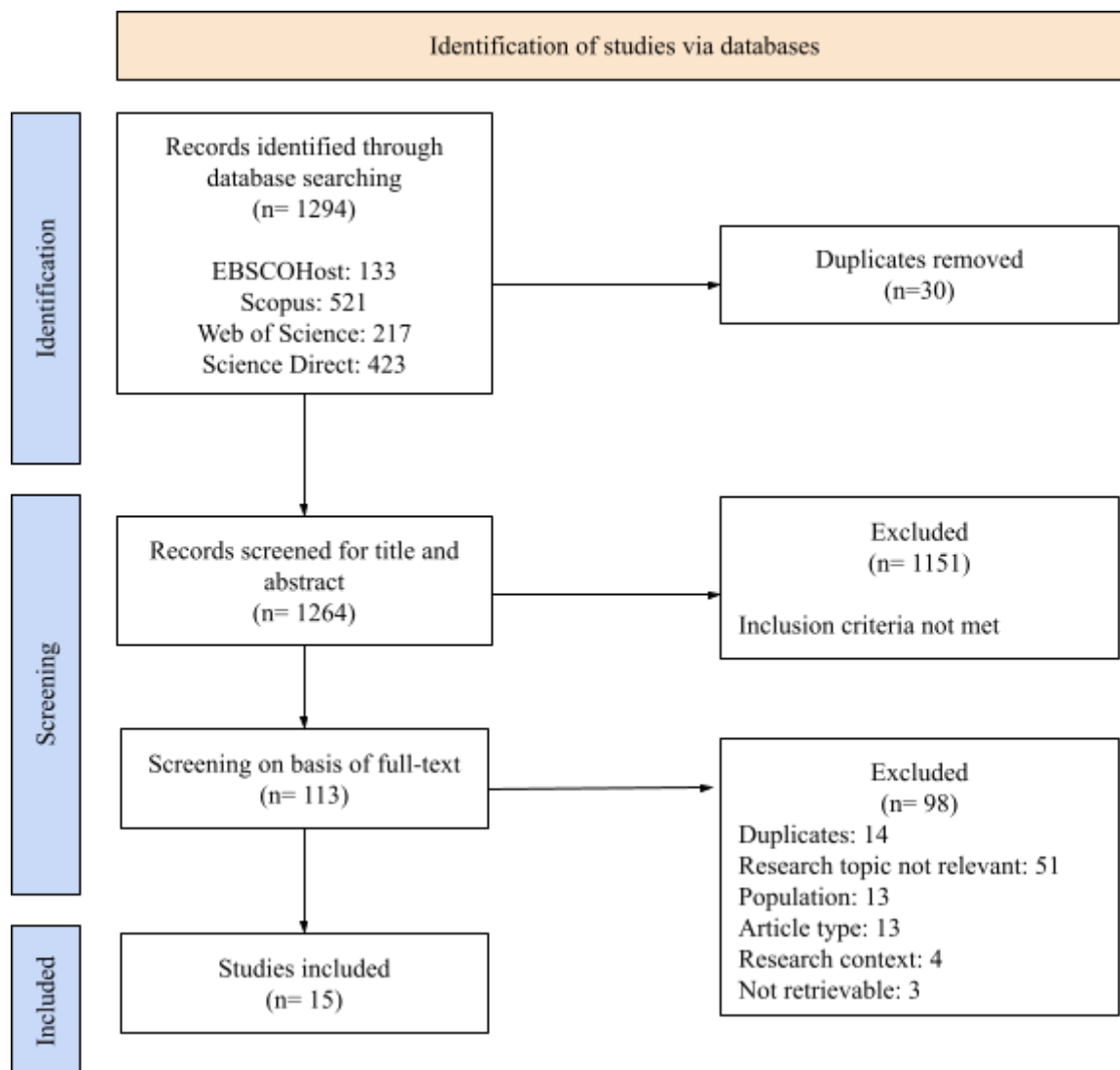
The literature collection and screening for eligibility were conducted by a research team consisting of one researcher and three master students from the University of Groningen. The articles provided by the automated search in all databases were collected in RefWorks (see Figure 1 for the complete data collection and screening). First, the titles and abstracts were screened for inclusion and exclusion criteria. For the next step, the articles identified as meeting the inclusion criteria were retrieved from the databases, and decisions were made regarding the eligibility based on the full articles. From the pool of eligible articles that resulted from the joint effort of the research team, each student began to extract data for his or her specific research project.

The literature search was conducted between February and April 2022 and yielded 1294 articles in total, out of which 15 articles met the requirements of eligibility (see Figure 1). Six articles were not retrievable through the University Library of Groningen and an attempt was made to retrieve these articles directly from the researchers through ResearchGate and by

requesting the articles from other libraries. The research team was able to access three articles (as of April 25<sup>th</sup> 2022). An attempt was made to identify further relevant research through the references cited in other review articles on the topic of gamification in organizational contexts, however, this did not yield further research articles fitting the inclusion criteria.

**Figure 1**

*Literature Search and Screening Process*



### **Analysis and Data Extraction**

The body of literature was developed and evaluated with the SPIDER framework as described by Cooke et al (2012). This framework provides a standardized procedure for collecting data for systematic reviews, which allows transparency of the conclusions that are drawn from the body of literature. The SPIDER framework encourages researchers to define inclusion criteria for a list of items: (S) sample size, (PI) phenomenon of interest, (D) study design, (E) evaluation, and (R) research type. All included articles were checked for validity according to these criteria. The data extracted from the articles include the article title, author, year of publication, participants (population), type of organization, setting of training (security training, skills training, etc.), comparison method (comparison group y/n), psychological variables influencing the process of gamified training, and whether they were examined as outcome variables, mediators, or moderators.

## **Results**

### **Characteristics of the Included Articles**

The systematic literature search yielded a total of 15 articles meeting the inclusion criteria out of 1294 articles identified from the databases. The number of included articles represents 1.16% of the articles originally sourced from the different databases. The most frequent reason for exclusion during the course of the screening process was the research objectives not matching the research interest of this systematic review. The included articles were published in peer-reviewed journals between 2014 and 2022. The sample includes four case studies, three correlational studies, five experimental studies, one quasi-experimental study, one longitudinal study, one cross-sectional study, and one mixed-method study. The number of

participants ranged from 16 to 1718 with a median of 130 participants. The studies were conducted in different workplace environments (c.f. Table 2): banks ( $n=2$ ), the educational sector ( $n=2$ ), hospitals ( $n=2$ ), automotive retail companies ( $n=1$ ) and the public sector ( $n=2$ ). Four articles included data from companies in multiple sectors and two articles did not specify the sector of the organization in which the study took place. The articles represent a diverse geographical sample. Six articles stemmed from the USA, four from Asia (South Korea, India, Thailand, and Malaysia), three from Brazil, and three from Europe (France and Sweden). The context of training also showed a large variety: skills training ( $n=5$ ), security training ( $n=3$ ), onboarding and orientation ( $n=2$ ), health and well-being ( $n=2$ ), and anti-corruption training ( $n=1$ ). Two studies did not specify the context of training. Of the 15 articles in the included sample, eight studies (53%) used a comparison group.

### **Psychological Variables Influencing the Outcomes of Gamified Training**

Eleven articles investigated at least one psychological variable (74%, Table 2). Motivational variables were investigated in seven articles and attitudes were explored in three articles. One article considered both motivational and attitudinal factors. Five articles measured the psychological variable as an outcome variable of gamified training, while the remaining articles explored motivational and attitudinal variables as mediators or moderators of the relationship between gamified training design and training outcomes. Three studies used behavioral intentions (BI) to measure training outcomes. Behavioral intention is often more convenient to measure than actual behavior and is, therefore, often used instead of measuring actual employee behavior (or change in behavior). A large amount of literature suggests that these behavioral intentions are a good predictor of actual behavior (e.g. Ajzen, 1991; Davis et al., 1989; Legris et al., 2003).

**Table 2***Data Extraction*

Author	Year	N	Research Type	Population	Organization	Comparison Group	Training	Psychological Variable	Outcome/Mediator/Moderator
Miller et al	2018	27	Case study	Service desk employees	University	N	Orientation training	Engagement	Outcome
Newcomb et al.	2019	130	Correlational study	Entry-level direct care staff	Specialized education facility	N	Skills training	Engagement	Outcome
Silic & Lowry	2020	420	Experiment	Employees	Large international company	Y	Security Training	Immersion (Flow), and coping abilities (efficacy perceptions)	Mediator
Kim	2021	293	Correlational study	Retail employees	Automotive retail	N	Skills Training	Flow	Mediator
Nair & Mathew	2021	60	Experiment	Senior, middle and junior management	Privately owned organization and public sector firm	Y	Health Training	Learner motivation	Mediator
Thongmak	2021	255	Correlational study	Full-time employees	Not specified	N	Not specified	Self-determination	Mediator
deOliveira et al.	2019	136	Cross-sectional study	Public service Employees	Public court	N	Health training	Performance expectancy, effort expectancy, and familiarity	Mediator



**Table 2** (continued)

Lai et al.	2020	32	Experiment	Junior employees	Hospital	Y	Skills Training	Perception towards the gamification approach	Outcome
Dincelli & Chengalur-Smith	2020	1718	Longitudinal experiment	Employees	Not specified	Y	Security training	Changes in attitudes	Outcome
Armstrong & Landers	2017	273	Experiment	Employees	Not specified	Y	Security training	Attitude toward game-based	Moderator
Santos et al.	2021	66	Mixed methods	Professionals	Not specified	Y	Not specified	Engagement	Outcome
Cechella et al.	2021	53	Case study; Quasi-Experiment	Managers	Bank	Y	Skills training	N/A	N/A
Kornvers et al.	2019	16	Case study	Employees	Road procurement company	N	Skills training	N/A	N/A
Baxter et al.	2017	158	Case study	Employees	Bank	Y	Anti-corruption	N/A	N/A
Brull et al.	2017	115	Quasi-experiment	Nurses	Hospital	N	Orientation training	N/A	N/A

## EFFECTS OF MOTIVATION & ATTITUDE ON GAMIFIED TRAINING

One study in the sample measured both behavioral intention and actual behavior and the results support the assumption that a behavioral intention resulting from gamified training can predict actual employee behavior in a cyber security context (Silic & Lowry, 2020). Other articles measured training outcomes as knowledge acquired and performance appraisals (i.e. cognitive outcomes), skill-development (i.e. skill-based outcomes), and actual behavior (e.g. reaction to a cyber security threat). In the following sections, the results regarding motivational and attitudinal factors and their influence on the outcomes of gamified training are presented.

### ***Motivational Factors***

Three articles investigated employee engagement as an outcome of gamified training and it was indeed found to be resulting from the application of gamification in all three articles (Miller et al, 2018; Newcomb et al., 2019; Santos et al., 2010). Santos et al. (2010) additionally found a positive relationship between engagement and motivation. It should be noted that two of these studies used a qualitative approach based on semi-structured interviews (Miller et al., 2018; Santos et al., 2010) without a control condition (c.f. Table 2). The study that did include a comparison group found that gamification led to higher engagement than the traditional promotion-based approach (Newcomb et al., 2019). Four articles reported significant effects of motivational factors on outcomes of gamified training. A total of eight motivational factors that are introduced to training via game elements or game mechanics were identified in the articles of this sample. Challenge, relationship, perceived usefulness (Kim, 2021; Silic & Lowry, 2020), curiosity, joy, control (Silic & Lowry, 2020), familiarity (de Oliveira, 2019) and self-determination (Thongmak, 2021) have all been found to directly or indirectly influence

outcomes of gamified training (behavioral intentions such as continuance intentions, increased knowledge, or actual behavior) by appealing to employees' motivation. Curiosity, joy, control, perceived usefulness, and self-determination were found to have a direct effect on behavioral intention. In total, three motivational factors were found to mediate the relationship between gamification and training outcomes: Thongmak (2021) found that gamification indirectly influences life-long learning intentions via employees' self-determination. Additionally, flow (Kim, 2021; Silic & Lowry, 2020), and efficacy perceptions (Silic & Lowry, 2020) were identified as mediating variables.

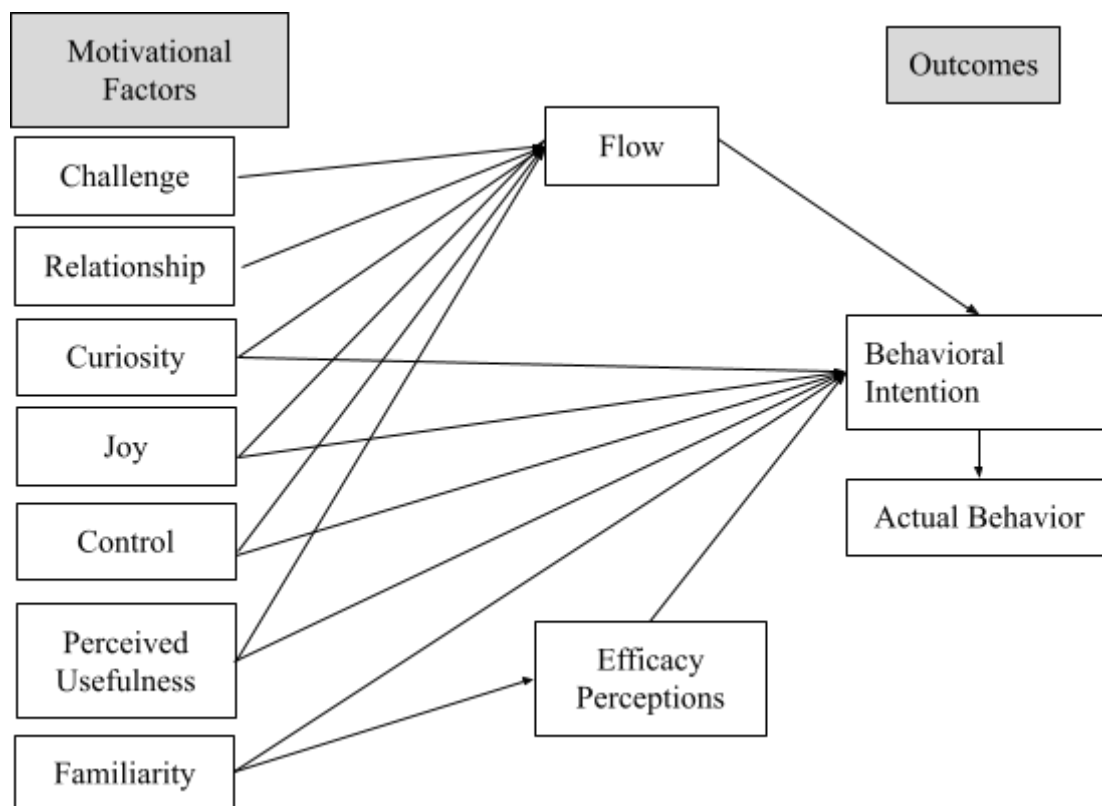
### ***Flow as a Mediator***

The mediating effect of flow on behavioral intention was found for a total of six motivational variables: Challenge, relationship, curiosity, joy, control, and perceived usefulness (Kim, 2021; Silic & Lowry, 2020). Flow is defined as a positive and desirable state in which people are fully immersed in their actions and intensively engaged (Csikszentmihalyi, 1975, p.36). In both articles challenge, as a motivational game mechanic, is found to be an antecedent for flow. Silic and Lowry (2020) additionally found a curvilinear relationship between challenge and flow. They concluded that when employees are not challenged enough by a training program, they experience boredom which prevents the experience of flow, but there is also a point at which a challenge can overwhelm employees and cause reduced training outcomes. Therefore, it seems that game elements should be added to training programs in such a way that an optimal challenge level is achieved to induce a flow experience in employees without overwhelming the trainee. Furthermore, the effect of game mechanics which allow trainees to form relationships, on training outcomes was fully mediated by flow and a partial mediation effect was found for the variables curiosity, joy, control, and perceived usefulness (c.f. Figure 3).

Kim (2021) also investigated whether flow is also a mediator for competition game mechanics but did not find significant results.

**Figure 3**

*Influence of Motivational Factors on Outcomes of Gamified Training*



*Note.* The figure is based on the extended Hedonic-Motivation System Adoption Model (HMSAM) introduced by Silic and Lowry (2020), and findings from other studies have been added to provide a graphical representation of the results of the analysis.

### ***Perceived Usefulness and Efficacy***

Two articles examined perceived usefulness as an outcome of gamified training (Dincelli & Chengalur-Smith, 2020; Silic & Lowry, 2020). The articles use slightly differing terminology to describe employees' perceptions of how useful the training is for their everyday work. Silic

and Lowry (2020) refer to it as “perceived intrinsic usefulness” and Dincelli and Chengalur-Smith (2020) refer to the same theoretical concept as “usability”. For the sake of simplicity, this concept will be referred to as “perceived usefulness” in this paper.

Both articles found that gamification positively affects employees’ perception of usefulness. Similar results were also found by de Oliveira et al. (2018). They found that performance expectancy and effort expectancy positively influence employees’ intention to use a gamified training system. They argue that the higher the familiarity with the training software, the greater the probability the training is evaluated as useful for daily work (i.e. perceived usefulness). From this, it seems that the expectations an employee has regarding the outcomes of the gamified training play a part in explaining the relationship between motivational game elements and training outcomes. Silic and Lowry (2020) additionally found that the relationship between perceived usefulness and behavioral intention is partially mediated by flow. Therefore, it seems that perceived usefulness directly affects training outcomes such as behavioral intentions, but that flow accounts partly for the effect.

Another motivational factor examined in the sample is efficacy. Silic and Lowry (2020) found that employees’ efficacy perceptions (i.e. employees’ beliefs they have an adaptive response to similar situations in the future) are influenced by learning, which they define as gaining more information about security threats (i.e. familiarity with the topic). Efficacy perceptions (also referred to as “positive coping skills”) were found to positively influence behavioral intentions, which suggests that efficacy perceptions are another mediator in the relationship between motivational influences resulting from gamified training and training outcomes. The use of game elements and mechanics leads to employees’ feeling more familiar with the training program or with a task which then has an impact on the training outcome via an

employee's perception of whether they are capable of dealing with the problem by themselves in the future.

### *Attitudes toward gamified training*

The findings on the effect of attitudes in this sample were mixed. One article proposed a moderating effect of attitudes on the relationship between training design and training outcomes (Armstrong & Landers, 2017). Specifically, the article proposes that the attitudes toward game-based learning moderate the relationship between the use of game fiction as a game mechanic and cognitive and skill-based training outcomes (declarative and procedural knowledge). This moderation effect was not supported in the study, however, a main effect of attitudes toward game-based learning on training outcomes was found. This finding suggests that employees who are open to the idea of game-based training also liked the training more which the article proposes might be a reflection of personality traits (e.g. openness to experience). Therefore, personality might moderate the relationship between gamified training and training outcomes rather than attitudes toward game-based training.

Armstrong and Landers (2017) argue that instead of attitudes toward game-based learning, attitudinal change might in fact be the moderating variable as proposed by the theory of gamified learning (Landers, 2015). However, another article in the sample found a mixed impact of gamified interventions on changing attitudes (Dincelli & Chengalur-Smith, 2020). The article found that while gamification training was successful in influencing both cognitive and behavioral attitudinal components of attitudes in the short-term, behavioral attitude was the only attitudinal component that was amenable to change in the long-term as well. Furthermore, they found that affectionate attitude was completely resistant to change. Changes in attitudes were measured as outcome variables of gamified training, therefore, this study does not make

predictions of how changes in attitudes relate to behavioral intentions or performance. However, the findings suggest that it is difficult to change attitudes in the long-term through gamified training and therefore the prediction by Armstrong and Landers that attitudinal change is a moderating variable seems doubtful. However, while attitudes toward gamified training were not found to be a moderating variable, some evidence was found in an exploratory analysis that suggests that motivation might mediate the relationship between attitudes and training outcomes (Armstrong & Landers, 2017).

### **Discussion**

This systematic literature review aimed to contribute to the understanding of the psychological variables involved in the process of gamified training by answering the following research question: “How is the influence of motivational factors and attitudes on the outcomes of gamified organizational training interventions portrayed in the current literature?” This review contributes to the theoretical understanding of the psychological experience of gamified training in organizational settings by providing a systematic overview of which motivational and attitudinal variables are explored in the literature and how these factors influence training outcomes. The included articles represented a diverse sample of training contexts, which suggests that the results are transferable to a broad variety of training contexts. The analysis of the included articles showed that only a small proportion of the literature investigated moderating and mediating effects of motivational and attitudinal factors while the remaining articles measured them as outcome variables. In this sample, about 40% of the included articles investigated mediating or moderating effects of motivational variables or attitudes, but if put into perspective of the more than one thousand articles identified through different databases, it becomes clear that there is currently only a small body of literature available on the mediating

effects involved in gamified organizational training. This lack of literature is also criticized by results from other review articles on this topic (Uslu et al., 2022). However, this review also showed that some well-constructed studies provide evidence about the mediating effect of different motivational and attitudinal factors.

The results from the sampled articles suggest that a variety of motivational factors introduced by gamified training directly influence training outcomes and that some of these relationships are partially or fully mediated by motivational variables (i.e. flow and efficacy perceptions). Efficacy perceptions were found to be a mediating variable that can be established through gamified training by providing a familiarity with the learning material and the software used. Flow was found to fully explain the relationship between challenge and relationship mechanisms on training outcomes and to partially explain the relationship for curiosity, control, joy, and perceived usefulness. Evidence was found to suggest that balancing challenge and skill level plays a key role in inducing a deeply engaged flow state in employees (Silic & Lowry, 2020). The results suggest that to optimally engage employees in the training, game elements should introduce a sufficient level of challenge to keep employees interested, combined with elements that allow making connections with fellow trainees, establishing a sense of control and perceived usefulness of the training. The resulting flow state will in turn positively influence employees' behavioral intentions and therefore should predict the transference of training content. Furthermore, the results of the analysis provide evidence for the conclusion that flow as a motivational factor is a mediator for some game mechanics (i.e. relationship strategy), but not others (i.e. competition) and, additionally, mediates the relationship between other motivational factors (i.e. curiosity, joy, control, and perceived usefulness) and training outcomes. Therefore, it seems that the mediating role of affective training outcomes might be more complex than



assumed because it seems that aspects of motivation differ in their influence on training outcomes.

Two theoretical perspectives were used by the articles in this sample to theoretically base the motivational variables tested. The motivational components of autonomy (referred to in the sample as control), relatedness (i.e. relationship game mechanics), and competence (i.e. balance between challenge and skills) were individually found to be antecedents of behavioral intentions as suggested by Self-Determination Theory (SDT; Ryan & Deci, 2017), however, this theory fails to explain mediating effects that influence this relationship (such as flow and efficacy perceptions). Therefore, while the elements of SDT can legitimately be used to explain the motivational affordances of gamified training in organizations it does, however, not adequately represent the complexity of how gamification influences training outcomes through motivational factors and attitudes toward gamified training.

The extended Hedonic-Motivation System Adoption Model (HMSAM) framework proposed by Silic and Lowry (2020) seems to better represent this complexity. The HMSAM was originally developed to address underlying intrinsic motivation and combines a hedonic motivation system, perceived ease of use, and behavioral intentions (Oluwajana et al., 2019). The advantage of the HMSAM framework over SDT is that it also includes mediation pathways. While only Silic and Lowry (2020) used the HMSAM to theoretically base their research on, certain pathways of the extended HMSAM are also supported by findings from other studies in this sample, which supports the assumption that an extended version of the HMSAM appropriately explains the motivational affordances of gamified organizational training. Since the HMSAM includes the components of autonomy (control in the HMSAM), relatedness (relationship), and competence (challenge), it could be argued that self-determination might also

be a mediating variable that might be present in this model. There also seems to be some evidence that the HMSAM could be further extended by adding other mediating variables apart from motivational factors (e.g. trainees' personality) and possibly by including the role of attitudes.

The evidence found on the effect of attitudes in this sample was less compelling than for motivational influences. Attitudes toward game-based learning were not found to be a moderating variable between game design and training outcomes and it has been suggested that changes in attitude might be the moderating factor instead (Armstrong & Landers, 2017). This hypothesis is partially supported by the finding that gamification was successful in influencing cognitive and behavioral attitudinal components of attitudes in the short-term (Dincelli & Chengalur-Smith, 2020). However, this effect did not exceed the effect of a non-gamified training intervention (Dincelli & Chengalur-Smith, 2020). Only behavioral attitude was affected long-term and affective components of attitudes were completely resistant to change. Therefore, there seems to be no strong evidence for the hypothesis that gamification leads to effective training via changing employees' attitudes. Overall, the findings suggest that attitude toward gamified training as well as change in attitudes might not be moderating variables. Other variables have been proposed to instead be moderating the relationship between game elements and mechanics and training outcomes, such as trainees' personalities (e.g. openness to experience; Armstrong & Landers, 2017). It should be noted that only a small number of studies in the sample investigated attitudes and the conclusions drawn should be interpreted carefully. While there seems to be a pattern of results, it is possible that attitudes toward gamified training or attitudinal change are in fact moderating variables but that this effect was not detected in the sampled research, possibly due to sampling effects. From the findings in this sample, it can be

concluded that the influence of attitudes on the process of gamified training in organizational contexts remains somewhat unclear and needs further consideration in research.

### **Directions for Future Research**

This review found support for the HMSAM research framework proposed by Silic and Lowry (2020) and identified possible extensions of the model. While not enough evidence was found to support attitudes toward gamified training as a moderating variable, attitudes or attitudinal components might still be a relevant extension to the model that could help to further complete the theoretical understanding of the psychological influences that influence training effectiveness. Attitudes should be tested within the proposed research framework as this could reveal interaction effects between attitudes and motivation which would lend validity to evidence suggesting that motivation might mediate the relationship between attitudes and training outcomes (Armstrong & Landers, 2017). Furthermore, due to the mixed-effects found in the review, the impact of attitudes toward gamified training on training outcomes needs to be clarified by further research. Replication studies are necessary to determine if there is in fact no moderating effect of attitudes toward gamified training or whether this effect was not detected in the examined articles. Additionally, it might be valuable to test other attitudes (or attitudinal components) employees might have when it comes to gamified training, such as attitudes toward the training technology.

While this research focused on the influence of motivation and attitudes, other factors contributing to the psychological experience of a game might mediate or moderate training outcomes. For example, it has been proposed that the gamification of a training program might lead to cognitive overload which can lead to diminished training performance (Adams et al., 2012). According to the distraction hypothesis, elaborate game designs might consume cognitive

resources which would otherwise be utilized for processing the training content and thus distract employees from learning (Adams et al., 2012). It might be worthwhile to investigate how cognitive overload influences motivation to find out how much gamification (i.e. the number of game elements and game mechanics utilized) is optimal to appeal to employees' motivation before it starts distracting them from the training to further understand the process through which gamification leads to improved training outcomes.

Other factors that might be of interest when it comes to answering the question through which factors gamified training initiatives achieve their effectiveness could be employees' perceptions of how meaningful the task or training is (Armstrong & Landers, 2017; Blohm & Leimeister, 2013). Nicholson (2012) proposed those game elements that are perceived as meaningful by users can induce intrinsic motivation without having to rely on extrinsic rewards. He further argues that to achieve long-term changes, gamification should provide different choices the user can make to choose what is meaningful to them. Therefore, the perceived meaningfulness of the training intervention might be another mediating motivational factor that should be examined in more detail.

### **Limitations**

One limitation of this review is the small sample size of included studies. The small sample size might be due to the selection of databases. Databases were chosen based on theoretical considerations, and accessibility (i.e. access through the University of Groningen). It might be possible that other databases include other relevant literature regarding the topic of interest and might have yielded a larger sample size. However, this seems unlikely when considering the theoretical reasons for using the selected databases and the fact that only a very small percentage of articles provided by the databases matched the topic of interest for this

research. It seems more likely that the small sample size is due to the fact that not much peer-reviewed research is available yet on the topic of psychological variables that influence outcomes of gamified training in organizations. This is not an unreasonable conclusion considering that gamification in organizational training is a relatively new area of research that is still developing.

Another limitation of the conclusions drawn by this systematic review is the study designs of the sample. Only slightly more than half of the articles in the sample used a control group and only 46 percent used a (quasi-) randomized experimental design. Especially the large percentage of case studies or qualitative studies in this sample are difficult to interpret because there is no (or very limited) statistical evaluation of the results. Additionally, case studies based on semi-structured interviews suffer from some degree of subjectivity and can only represent a snapshot in time as participants might change their opinion (Dixon-Woods et al., 2001). To increase the validity of the findings presented in this review, more studies should be conducted using an experimental design that includes a control group.

While this systematic literature review followed the PRISMA guidelines as closely as possible, some biases might still exist in this review. One factor that might have introduced bias was the way the research team worked together to collect the literature sample. Most articles were reviewed and coded by only one member of the research team. Siddaway et al. (2019) recommends that the literature search and screening process should ideally be conducted by two separate reviewers. However, they also acknowledge that this is not always possible. In this case, the time frame of the research project meant that the best approach for this review was to split the workload to examine more literature in the available time.

## **Conclusion**

This systematic literature review contributes to the body of literature by synthesizing research regarding the influence of motivational variables and attitudes towards gamified training on training outcomes. The results from this systematic review suggest that the psychological experience does matter when it comes to outcomes of gamified training initiatives in the organizational context and that this experience is quite complex. The results support the assumption that affective training outcomes mediate the relationship between game mechanics and training outcomes only for motivational factors, but not attitudes. Several motivational variables were found to directly impact training outcomes, and flow, and efficacy perceptions were identified as mediating factors. Attitudes toward gamified training were not found to be a moderator, however, there is weak evidence suggesting that motivation might mediate the relationship between attitudes and training outcomes. Based on the results of this review a framework has been proposed which needs further testing in future research. The findings show that it is important for practitioners to pay attention to how the gamified training is perceived and how game elements contribute to this psychological experience. Several avenues for future research are presented to address the gaps in the literature identified by this review.

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**Appendix A**  
**PRISMA Checklist (2020)**

Section and Topic	Item NR	Checklist Item	Applicant to this review
<b>Title</b>			
Title	1	Identify the report as a systematic review	x
<b>Abstract</b>			
Abstract	2	See PRISMA 2020 for Abstract checklist	x
<b>Introduction</b>			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	x
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses	x
Methods			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the synthesis	x
Information sources	6	Specify all databases and other sources searched to identify data. Specify the date when each source was searched	x
Search strategy	7	Present the full search strategies for all databases, registers, and websites, including any filters and limits used.	x
Selection process	8	Specify methods used to collect data from reports including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	x
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of	x



		automation tools used in the process.	
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	x
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	x
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	x
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	N/A
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	x
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	N/A
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	N/A
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	x

	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Potential biases explained in Discussion
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	x
<b>Results</b>			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	x
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	x
Study characteristics	17	Cite each included study and present its characteristics.	x
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	N/A
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	N/A
Results of syntheses	20a	For each synthesis, briefly summarize the characteristics and risk of bias among contributing studies.	x
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing	N/A

		groups, describe the direction of the effect.	
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	N/A
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	N/A
<b>Discussion</b>			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	x
	23b	Discuss any limitations of the evidence included in the review.	x
	23c	Discuss any limitations of the review processes used.	x
	23d	Discuss implications of the results for practice, policy, and future research.	x
<b>Other Information</b>			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	N/A
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	N/A
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial	N/A

		support for the review, and the role of the funders or sponsors in the review.	
Competing interests	26	Declare any competing interests of review authors.	N/A
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	N/A