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## Learning Outcomes With Gamification: An Integrative Review of Gamification in Training For Occupational Health Psychology

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LEARNING OUTCOMES WITH GAMIFICATION: AN INTEGRATIVE  
REVIEW OF GAMIFICATION IN TRAINING FOR OCCUPATIONAL  
HEALTH PSYCHOLOGY

by

DISHANKI SAVLA

A thesis submitted in partial fulfillment of the requirements  
for the Honors in the Major Program in Psychology  
in the College of the Sciences  
and in the Burnett Honors College  
at the University of Central Florida  
Orlando, Florida

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## **ABSTRACT**

Gamification has received a lot of recognition over the past few years. The current generation has grown up playing video games and online gaming is increasing daily. Thus, I/O psychologists and other scholars have focused their attention on gamification in order to build intrinsic motivation in employees. Gamification can be explained as a method of applying gaming techniques in nongaming concepts in order to increase productivity, knowledge, motivation, etc. Due to the increase in technology a different approach to encourage learning is crucial. The current generation of workers have been brought up using games and thus, using gamification at work places has better chances of increasing positive worker behavior. This paper summarizes the literature on gamification used in work places to improve the physical health of workers. This paper focuses on studies that use either gamification or non-gamification techniques in order to differentiate between the physical activity of the employees.

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## **Introduction**

Gamification is broadly defined as the application of gaming mechanisms in nongame contexts (Deterding, Dixon, Khaled, & Nacke, 2013). Gamification has received a lot of attraction from numerous companies and businesses in order to enhance learning, motivation, loyalty and other productive behaviors amongst employees and customers. Gamification was listed on Society of Industrial Organizational Psychology's Top-10 workplace trends for 2014 (Munson, 2013).

Gamification can be applied to work environments. At the corporate level gamification is used to improve existing experiences by applying them to motivational techniques that make games captivating and help businesses achieve elevated levels of employee knowledge, motivation, and loyalty. This can be integrated as an in-person exercise or virtually. For example, LinkedIn uses gamification by adding gaming elements such as progress bars. Generally, when people hear gamification they misinterpret it for concepts such as pervasive games or augmented reality. Gamification does include components from some of these games, therefore, the end result for gamification is different than games that are played for leisure. In gamification instead of developing a full game, gaming elements are layered over an existing program or context in order to amplify users' motivation to engage within that context (Kapp, 2014). Common elements that are typically "borrowed" from traditional games and applied in nongame contexts include levels, badges, points, progress bars, leader boards, and virtual goods. Each serves to motivate users by providing feedback, recognition, status, and the potential for competition among users (Muntean, 2011).

At the corporate level gamification is used in multiple settings such as in marketing, training, hiring, etc. Training via the mechanism of gamification is generally rewarding as it

increases learner motivation and knowledge. Moreover, the increasing use of e-learning within training and development initiatives makes the addition of gaming elements to learning contexts convenient and feasible. Gaming elements can be used to encourage participation and interaction in a virtual training session by awarding points or badges to learners when they interact with each other or the instructor. Levels, points, or badges can also be awarded to individuals as they complete learning modules or sessions. Similarly, leader boards can be used to motivate course completion by displaying other learners' progress throughout a training initiative. A study conducted by Kapp (2014) provides evidence for the theory that gamification benefits training. In their study Kapp (2014) describes how Pep boys realized a 45% reduction in safety incidents and claims following the introduction of gamification into their training program.

Numerous companies have included gamification in their training component, for example, Cisco has invested in a global social media training program for its employees and contractors to build and leverage their social media skill set. There are 46 courses as part of the program but as this can be overwhelming for employees, they use a gamified solution to increase participation. They gamify learning by introducing three levels of certification for the social media training program: Specialist, Strategist, and Master as well as four sub-certification levels for HR, external communications, sales, and internal partner teams. Competition and collaboration have been implanted in the gamified version by team challenges. Results show that since they gamified their social media training program, more than 650 Cisco employees have been certified with over 13,000 courses taken. Similarly, Deloitte gamified their leadership training curriculum for senior executives as they had trouble encouraging executives to start and end the non-gamified version of the training program. Deloitte used Badgeville to introduce gamified elements like badges, leaderboards and status symbols that measured how many

executives were participating and completing courses. The results showed that the average time taken to complete the training curriculum dropped by 50% and the program has seen a 46.6% increase in the number of users that return to the site daily. These examples help identify the advantages of gamification in workplaces especially training. Therefore, gamification is one of those concepts that helps strike a balance between the scientist-practitioner model. Industrial-Organizational psychologists have the opportunity to gamify training within organizations to deliver the company their desired results.

Prior to gamification, workplace training consisted of videos, manuals, paperwork, etc. However, a gamified version of training can help improve worker motivation and productivity. In order for gamification to work, the literature suggests that specific game mechanics need to be in place. Game mechanics include badges, points, challenges, rewards, leaderboards, and levels (Hamari, Koivisto, & Sarsa, 2014; Hanus & Fox, 2015). Using game mechanics and other types of gaming strategies allows learners to solve problems in an engaging and fun way (Bruder, 2015). Using game mechanics can increase the average retention rate of information up to 10 times higher than that resulting from lecture (Cook, 2013). Game mechanics need to be combined with achievable goals, rules, voluntary participation, and feedback to work (McGonigal, 2011).



## **Gamification Mechanisms**

There are multiple mechanisms that can be used to gamify training. Given below are the brief descriptions of some of the mechanisms used in workplace training:

1) Collaboration: This technique can help employees socialize and have a sense of belongingness within the new environment. This will help develop intrinsic motivation and encourage the employee to work with a group.

2) Points: They can be used in many ways to make learning more engaging. Points provide immediate feedback and can be displayed externally to show others how well (or not well) a player is doing (Werbach & Hunter, 2012; Zepeda, 2014). Points also show progress easily and provide data to the educator to indicate how well the learner understands the material.

3) Badges: A badge signifies a visual cue to the player that he or she has achieved something (Bruder, 2015). Many exercise programs give exercisers badges when they finish 10,000 steps or when they run 3 miles, for example. Badges are flexible and can be given for just about any type of activity. They also provide a social component and can be used expressively on social media platforms showcasing accomplishments.

4) Leveling Up: Using levels helps participants know how they are progressing within the content (Bruder, 2015; Reeves & Read, 2009; Werbach & Hunter, 2012). Educators use leveling to require learners to advance by completing missions, achieving points, or collecting things. Leveling up is easy to do and can be used when the educator is attempting to differentiate certain groups from other groups.

5) Leaderboards: Leaderboards show approximately how many people are playing a game and how the gamer is doing comparatively. Many leaderboards show only the top players.

Leaderboards provide a bit of competition and can be a fun way to motivate players to continue learning the content (i.e., to get higher on the leaderboard).

6) Competition: Competition can help motivate the employees to improve their performance and work harder which in turn will increase their productivity. Competitions can increase intrinsic or extrinsic motivation depending on the end result. For example, if the competition is conducted using formation of teams then the person might develop intrinsic motivation to prove their skills or expertise. On the other hand, if it is individual and the reward is beneficial to the worker it might lead to extrinsic motivation.

7) Rewards: Gaming mechanism rewards is interlinked with competition because rewards could be one of the end results of competition. Rewards could be of any type such as monetary, goods, benefits, recognition, or appreciation. Rewards that are meaningful to the employee can trigger intrinsic motivation.

8) Notification: Feedback in the form of notification can help increase the speed at which the employee changes their behavior. Notification is way to deliver instant feedback which is focused at improving the worker behavior. Notifications help deliver positive and negative feedback. Positive feedback will reinforce good behavior, alternatively, negative feedback will help the worker recognize their drawbacks and encourage them to fill the gaps.

9) Progress Bar: This mechanism helps users see their progress and the user can be motivated to complete the progress bar. This visualization helps the user to see their current position and increase their efforts to meet the end stage of the bar.

10) Social Feed: Social feed can lead to competitiveness within the users which will help increase and improve their efforts. They will be able to see how everyone is doing and thus, motivate them to improve their performance.

### **Gamification in Health and Safety-related Training:**

Google trends illustrated that the term gamification started attracting interest since 2010. Gamification has mostly been applied to task-related training. A full-time job in most workplaces consists of spending 8 hours a day at their workplace. Thus, programs that focus on worker's physical activity can be a beneficial to improve their overall fitness and well-being.

However, examination of gamification in healthcare and safety-related training is an ongoing process since gamification has mostly been used in industries which are not healthcare related. Gamification in healthcare industry has been a new line of research, thus, the integrative review conducted in this study will help understand the current stage of gamification and its effectiveness.

### **Gamification and Motivation:**

#### **Extrinsic motivation:**

One of the main reasons of using gamification is to increase motivation which will help encourage the users to perform their training tasks effectively. Extrinsic motivation is the type of motivation where operant conditioning is used. It is a reward-driven behavior which uses outside sources such as rewards and incentives to increase or decrease the likelihood of specific behaviors. The traditional teaching style uses a simple approach: Teach, learn, and test. However, this cycle may not be effective on every learner. Experts in extrinsic motivation state the reason for this is because the learner is only motivated to learn the content to pass the test (Werbach & Hunter, 2012). In workplaces gamification is used to increase this type of motivation by incentives such as cashbacks, employee of the year benefits, etc. This helps keep the worker motivated to improve their performance.

**Intrinsic motivation:**

Intrinsic motivation works when a person is motivated without any external rewards. This type of motivation works when the task is enjoyable and pleasant for the user and does not require any incentives or rewards. Gamification focuses more effort on meeting the intrinsic needs of learners by providing immediate feedback, providing control over the material, and inspiring curiosity (Kapp, 2012). Because learners want to participate, knowledge improves, as do learning and development (Cook, 2013). Intrinsic motivation can improve the quality of the task because the person is self-motivated, however, if the reward is essential and meaningful to the person it can also lead to similar results. Research has proven that the quality of an experience can vary depending on whether the person is intrinsically or extrinsically motivated (Ryan & Deci, 2000).

## **Purpose**

The purpose of this integrative literature review was to examine the prevalence of gamification in workplace physical activity interventions and the types of gamification strategies used. This review will also describe the results of gamified and non-gamified interventions, which will advance occupational health psychology's understanding of gamified interventions in terms of participation, dropout, attitudes toward the intervention, and results of the intervention in health or work-related outcomes.

The hypotheses for this study are as follows:

Hypothesis 1: Gamified interventions would be associated with better levels of participation and lower dropout rates.

Hypothesis 2: Gamified interventions would be associated with increased levels of physical activity compared to control groups.

## **Methods**

The sample of articles for this integrative literature review were peer-reviewed articles identified in a previous systematic literature review on workplace physical activity interventions (To et al., 2013). This systematic literature review identified a sample of 12 articles evaluating workplace physical activity interventions. In the present study, these 12 articles were read and coded for the following variables: article title and year, intervention activities, presence of gamification, type of gamification element, type of occupation or industry, participation rate, dropout rate, satisfaction with the intervention, outcome variables measured, and the presence or absence of significant results in intervention outcome variables.

## Results

### Intervention activities:

Intervention activities for few studies were similar and most of the studies also focused on jobs that were sedentary. The study findings of Campbell et al. (2002), used the following type of non-gamified intervention: intervention (4 worksites): two computer-tailored magazines and a natural helper's program, delayed intervention (5 worksites): one tailored magazine. The participants of this study were blue collar female employees from textile or manufacturing industry and the participation rate was 63%. At the 18-month follow-up, the intervention had increased fruit and vegetable consumption by 0.7 daily servings compared to no change in the delayed group ( $p < .05$ ). Significant differences in fat intake were observed at 6 months ( $p < .05$ ) but not at 18 months (Campbell et al., 2002). The project was a successful model for achieving certain health behavior changes among blue-collar women. Another study focused on a team-centered curriculum and an individual motivational interviewing intervention (Mackinnon et al., 2010). This study focused on the body mass index (BMI) of firefighter's and found a positive effect for BMI in both intervention activities.

There were few studies which used physical exercise as their intervention activity. A study by Pederson et al, used reference intervention (REF), specific resistance training (SRT), and All-round physical exercise (APE) as their intervention activities (2008). This study focused on public administration industry workers and found that SRT and APE compared with REF showed significant reductions in systolic blood pressure, body fat percentage and back pain. The use of pedometers for intervention activities was common for a lot of studies as well. For example, a study by Chan et. al, (2004) and DeCocker et. al, (2009) used pedometer based physical activity intervention. The study by Chan et. al., (2004) found that steps per day

increased compared to baseline and also increase the physical activity in sedentary population. However, the study by DeCocker et. al., (2009) did not find significant results. A pedometer-based study by Faghri et. al, used team formation and group leader selection in their pedometer-based intervention (2008). The result concluded that there was increase in the number of steps taken every week except for week 7 due to Thanksgiving and Christmas break (Faghri et. al, 2008). Overall, this study builds upon the previous studies that pedometer-based interventions help increase the physical activity amongst sedentary population.

#### Type of gamification:

In a study by Dishman, Wilson, and Vandenberg (2009) they used gamification activities such as organizational action, personal and team goal-setting as gamification mechanisms. They included participants from the retail industry and the participation rate was 66.92%. In this study, the participants in the intervention had greater increases in moderate and vigorous physical activity and walking compared to participants in the health education condition. The results support the feasibility and efficacy of the move to improve intervention and the role of the goal-setting to attain increased physical activity levels (Dishman et. al, 2009). Setting goals and working in teams is a common form of gamification used in intervention activities. The study by Faghri et. al, (2008) uses team formation and group leader selection as a gamification mechanism in their study.

#### Results of insignificant studies:

The study by DeCocker et. al (2009), did not use any type of gamification and found that the intervention effect was only found in participants who were already active. However, this study helped reveal that future studies should use different approach for employees who are inactive compared to employees who are already active. A study conducted by French, Harnack,

Hannan, Mitchell, Gerlach, and Toomey used intervention activities such as setting up a vending machine of healthy foods, fitness facilities, self-weighing team competition, behavioral food, and physical activity programs, fitness expo, farmer's market, and new driver weight gain prevention program (2010). The participation rate for this study was 74% and the participants were from automobile industry. The results show that the energy intake decreased significantly, and fruit vegetable intake increased significantly in intervention garages compared to control garages. Physical activity change for this study was not significant (French, Harnack, Hannan, Mitchell, Gerlach, & Toomey, 2010). In this study, worksite intervention on nutrition and physical activity behavior change may have limited impact on BMI among transit workers who spend most of their workday outside the worksite (French, Harnack, Hannan, Mitchell, Gerlach, & Toomey, 2010).

Overall, the results for gamified intervention had showed significant improvements in the physical activity except for one study which found that the intervention effect was present only in employees who were already active. Gamification in most studies used pedometers or self-reported behaviors which demonstrate that further technological advancement will also be beneficial to incorporate gamification in interventions.



## **Discussion**

This literature review helps understand that although the trend of gamification has gained currency recently, numerous health related worksite interventions are incorporating gamification in their interventions. The studies that used non-gamified version of interventions did achieve positive results in some cases, on the other hand, gamified version of training received superior results. Most of the studies focused on sedentary populations and the interventions benefitted the participants positively. Gaming elements have been used in most workplace contexts and this review helps understand the use of gamification in health care settings. At the current stage gamification in healthcare industry has been limited to use of self-reported goals, teamwork, etc. and the intervention activities focus on pedometers, magazines, etc. Thus, further research in this field is required for the advancement of gamification in healthcare and safety related training. Most studies focused on physical activity, although, other aspects of health such as nutrition, stress, diet, etc. also need to be taken into consideration. Physical activity depends on a lot of other factors such as means, time, motivation, ability, etc. Thus, to use factors such as BMI, BP, etc. to measure physical activity factors such as means, motivation, etc. should be considered first. These factors will help understand the differences between active and inactive employees and the we will be better able to assess the effectiveness of gamified vs. non-gamified interventions.

The systematic review of high-quality peer reviewed studies is advantageous in order to expand our knowledge on the current stage of gamification, however, the quantitative approach to this point of view would be the most useful. A meta-analysis for this study would also provide promising result as there is some overlap in this area. Overall, this study is a beginning point to set up a base for a knowledge on gamification in healthcare and safety training which can be

used for a further line of research. The field of psychology has an opportunity to explore and research more in the context of gamification. This knowledge can further be used within organizations to improve worker health, productivity, knowledge, etc.

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# Appendix

Table 1:

Article Authors & Year	Intervention Activities	Gamification (Yes/No)	Type of Gamification (e.g. points, badges, leaderboard, social)	Type of Occupation/Industry	Participation Rate	Dropout Rate	Satisfaction with Intervention	Outcome Variables	Results In Outcome Variables
Campbell et al (2002)	Intervention (4 workites): two computer-tailored magazines and a natural helpers program. Delayed intervention (5 workites): one tailored magazine	No	N/A	Textile or light Manufacturing industry (Blue collar female employees)	63%	37%	At the 18-month follow-up, the intervention had increased fruit and vegetable consumption by 0.7 daily servings compared to no change in the delayed group (p<.05). Significant differences in fat intake were observed at 6 months (p<.05) but not at 18 months	The HWW project was a successful model for achieving certain health behavior changes among blue-collar women	Significant
Chan et al (2004)	Pedometer based physical activity intervention	Yes	Setting goals	Federal or provincial government-funded departments or agencies	59%	41%	Steps per day increased compared to baseline	The intervention helped increase physical activity in sedentary population	Significant
DeCocker et al (2009)	Pedometer based and self reported physical activity intervention	No	N/A	White-collar workers with sedentary job	49%	51%	The intervention effect was only present in already active employees	Future workplace projects should give extra attention to inactive employees	Not significant
Dishman et al (2009)	Organizational action, personal and team goal-setting	Yes	Personal and team goal-setting	Retail industry (Home depot)	66.92%	33.07%	Participants in the intervention had greater increases in moderate and vigorous physical activity and walking compared to participants in the health education condition	The results support the feasibility and efficacy of the move to improve intervention and the role of the goal-setting to attain increased physical activity levels	Significant
Faghri et al (2008)	Pedometer based physical activity intervention	Yes	Team formation and group leader selection	Employees where most jobs were sedentary	56%	44%	There was increase in the number of steps taken every week except for week 7 due to thanksgiving and christmas break	Pedometer based intervention helps increase the number of steps taken	Significant
French et al (2010)	Intervention activities included setting up a vending machine of healthy foods, fitness facilities, self-weighting team competition, behavioral food and physical activity programs, fitness expo, farmer's market, new driver weight gain prevention mentor program	Yes	Team formation for self-weighting competition	Automobile industry (Garage employees)	74%	26%	Energy intake decreased significantly, and fruit and vegetable intake increased significantly in intervention garages compared to control garages. Physical activity change was not significant	Worksite intervention on nutrition and physical activity behavior changemay have limited impact on BMI among transit workers who spend most of their workday outside the worksite	Not significant
Gemson et al (2008)	Tailored intervention on body mass index (BMI) and blood pressure (BP) among hypertensive employee.	No	N/A	Financial services firm	varies depending on condition	-	The experimental group showed a significant decline in systolic and diastolic BP compared to the control group	The pilot study showed promising results for future research	Significant
Gilson et al (2009)	3 Groups: control group, route-based walking group, incidental walking group	No	N/A	University employees	83%	17%	Intervention group had significantly increased walking compared to control group	There was variability in step counts within the intervention group suggesting that walking intervention are more beneficial to those in need	Significant
MacKinnon et al (2010)	Team- centered peer-taught curriculum intervention and an individual motivational interviewing intervention	No	N/A	Firefighters	78%	22%	Both intervention groups had positive result	The positive results for intervention group dissipated at later annual assessments	Not significant
Pederson et al (2008)	Reference intervention (REF), specific resistance training (SRT), All-round physical exercise (APE)	No	N/A	Public administration workers	25%	75%	SRT and APE compared with REF showed significant reductions in systolic blood pressure, body fat percentage and back pain	SRT and APE are recommended over REF since these interventions resulted in clinically relevant reductions of cardiovascular and metabolic syndrome related risk	Significant
Plotnikoff et al (2007)	Stage matched intervention, standard intervention and no-contact control group	No	N/A	Employees from Canadian workites	69%	31%	The weekly metabolic equivalent was different for the three groups but the results were not significant	Future sties should pay attention to gender differences	Not significant
Proper et al (2003)	Critical review of worksite physical activity programs on physical activity, physical fitness and health	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A