Gamification and Professional Development: An Assessment for Capacity Building Among Construction Workers

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The objective of this study is to examine how gamification and teaching-learning techniques might help construction professionals improve professionally. This was a qualitative study, including case studies as a tool. We chose a medium-sized construction business based in Salvador, Bahia to conduct field investigation. The study identified the construction worker profile; the gamification elements best suited to worker training, development, and education based on the player styles of the Explorer and Socializer archetypes; and the teaching-learning strategies best suited to workers who preferred the Accommodation learning style. This article argues that gamification-based training and development programs may benefit workers, construction sites, and professional training in the construction industry. The study brings the conceptual-theoretical advancement of training and development in the construction industry much closer to the reality of construction sites, as well as introducing an innovative technique such as gamification to facilitate laborer learning and aid in the adaptation of training to the specific needs of this audience. The number of construction sites analyzed, and the sample size are both limitations.
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The construction sector is navigating a wave of transformation, pushing companies to find new ways to stay aligned with shifting market demands—while reducing production setbacks. Amid these challenges, gamification—the integration of game elements into non-game settings—has emerged as a powerful tool to foster deeper engagement and learning. By simulating immersive, game-like experiences, it promotes experimentation, enhances intrinsic motivation, and supports meaningful skill development.

Research by Leite and colleagues [1] and Oke and colleagues [2] underscores gamification's ability to strengthen communication between tactical and operational teams, improve information retention, and boost workplace morale. These benefits are especially relevant in construction, where repetitive tasks, limited feedback, and a heavy reliance on manual labor can dampen motivation.

Training is the key to both personal growth and professional competence. Yet for many construction workers, skills are gained through hands-on experience rather than formal education—creating a disconnect between practical know-how and academic advancements. With few incentives for workers to pursue structured training and the industry's lack of emphasis on workforce development, this gap continues to grow.

To address this, the article investigates gamified training strategies tailored to the needs of on-site workers. By applying an empathy map to understand worker demographics, roles, and motivations, the study identifies which gamification mechanics and educational techniques most effectively build essential capabilities.

Training, Development, and Learning Styles in Corporate Education

Corporate training and development leverage instructional technology to enhance professionals' knowledge, skills, and attitudes (KSA), aiming to

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close performance gaps and prepare individuals for future roles [3]. These efforts foster competencies, which are synergistic combinations of knowledge, abilities, and motivation:

- Knowledge involves understanding gained through education and experience.
- Skills reflect how that knowledge is applied in practice.
- Attitudes reveal a person's drive to effectively use their expertise on the job [4].

To design effective training, it's crucial to understand how people learn. This study adopts Kolb's experiential learning theory, which defines learning as "the process of creating knowledge through the transformation of experience" [5]

Kolb's model integrates four learning processes:

- Concrete Experience (CE): direct engagement with new situations.
- Reflective Observation (RO): thoughtful analysis of experiences.
- Abstract Conceptualization (AC): forming ideas and theories.
- Active Experimentation (AE): applying new concepts in problem-solving.

Learning results from how individuals perceive and transform experiences, forming a continuous knowledge cycle.

Kolb also identified four learning styles—divergent, assimilative, convergent, and accommodating—based on how learners combine these modes. To assess these styles, he developed the Learning Style Inventory (LSI), a tool that promotes self-awareness and supports educational research rooted in experiential learning.

Knowles and colleagues [6] provide a practical basis for adult education. This research examines the learning processes of construction workers, enabling the development of training programs that are specifically tailored to their requirements for improved outcomes.

Gamification and Player Profiles in Training

Gamification is a training strategy that applies game design elements—like mechanics, dynamics, and components—in non-game environments to inspire engagement, motivate behavior, support learning, and solve challenges [7,8]. While these applications include game-like features, they are not considered actual games [8]. Researchers frequently explore gamification as a means to positively influence motivation and behavior [9].

Its growing popularity is attributed to its link with intrinsic motivation, explained through self-determination theory (SDT), which distinguishes between desires to stand out or remain unseen [10]. Gamification can be implemented in both digital and analog formats, offering flexibility in reaching diverse audiences [11].

According to Burke [12], gamification and learning are closely connected, as gamified environments create emotional engagement and encourage progress. They involve structured cycles of instructions, challenges, and feedback that sustain learner interest.

To maximize impact, it's vital to understand player profiles. Alves [11] recommends the Empathy Map—a strategic tool for capturing users' emotional and behavioral patterns. It goes beyond demographics by analyzing six quadrants: what users see, hear, say/do, think/feel, and their frustrations. This holistic view supports the creation of personas for targeted gamification.

In this study, the Empathy Map was used to analyze construction workers' profiles. Bartle's [13] player types were then applied: (1) Predators: competitive, focused on defeating others. (2) Conquerors: driven by achievement and recognition. (3) Explorers: motivated by mastery and experience. (4) Socializers: seek connection and collaboration.

Understanding these styles supports personalized gamified training, improving engagement and outcomes for workers with varied motivations and learning preferences.

Materials and Methods

This research employed a case study design to investigate a contemporary phenomenon within

its real-world context, facilitating the exploration of the interface between theory and practice [14].

The selected case was Company X, a construction firm headquartered in Salvador, Bahia, boasting 33 years of experience in managing public-sector projects across infrastructure, historical restoration, and industrial construction.

A qualitative approach was adopted [15], focusing on in-situ data collection at the construction site to gather descriptive insights into workers' competencies and professional profiles. A total of 37 semi-structured interviews were conducted, eliciting participant reflections on demographic characteristics, lifestyle habits, personal aspirations, sources of frustration, perceptions of success, and challenges in the workplace. Data were analyzed using the Empathy Map framework [16], enabling the development of detailed personas that represent different worker archetypes.

Theoretical saturation guided the sampling process, with data collection continuing until no new themes or perspectives emerged. To assess gamification elements relevant to training engagement, participants completed surveys aligned with Bartle's player archetypes [13].

Additionally, the study explored learning preferences by administering modified versions of Kolb's Learning Style Inventory (1993) to a subgroup of 10 workers. The GCIS research group (IFBA) facilitated the survey distribution through structured phone outreach, using a pre-defined contact spreadsheet. The survey process also adhered to the principle of theoretical saturation.

Results and Discussion

Target Audience Assesment

The first round of interviews revealed that all interviewees were male, with 47% having incomplete primary education and 26% having complete primary education. This low level of education aligns with the sector's low educational attainment, as highlighted by [17-19]. Additionally, 52% of the interviewees held professional positions, 37% were helpers, and 11% were servants. The second block of the interview aimed to get to know the worker using the empathy map, as shown in Figure 1, which depicts the most common themes in each quadrant.

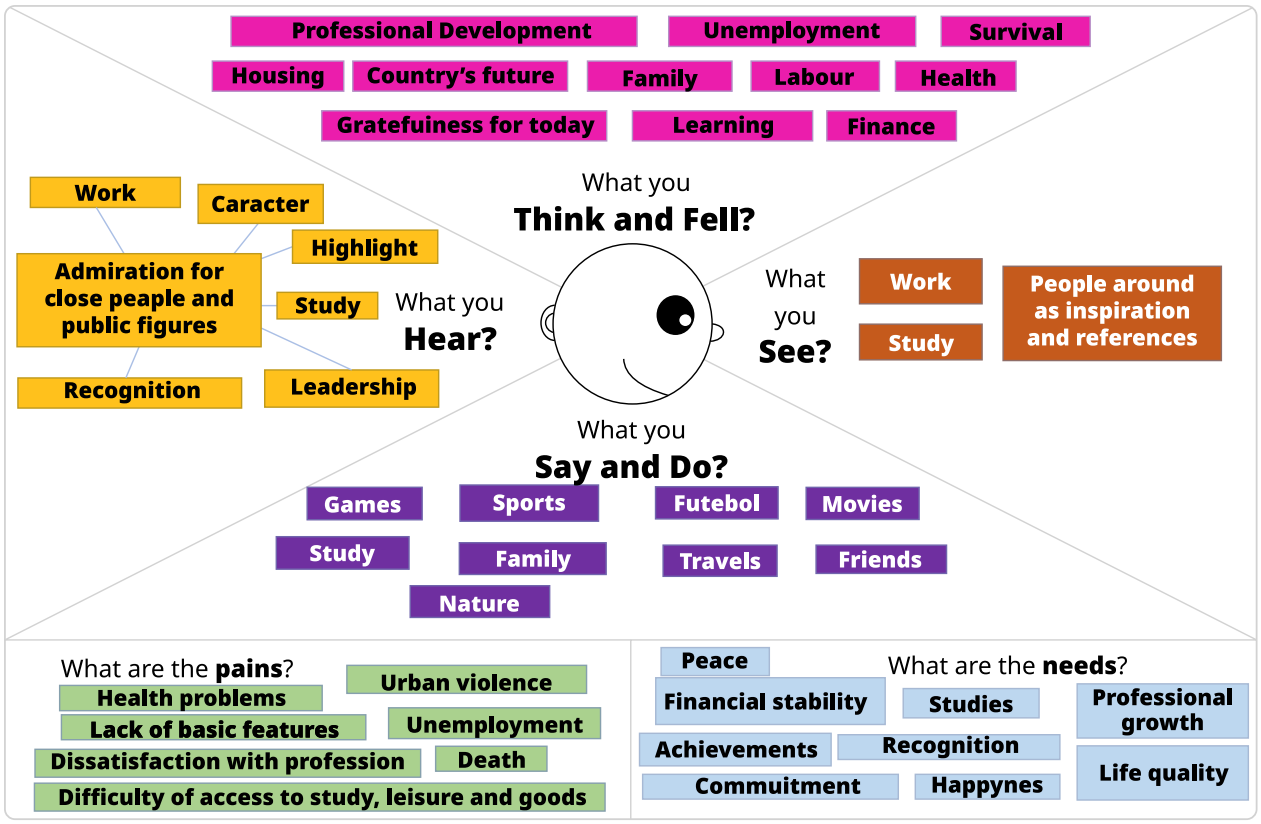
The map analysis indicated that professional development through education is identified as important in the "what they think and feel" quadrant, reflecting career commitment.

All four quadrants of the map represented work and study, indicating a high interest in training among employees. Indeed, a lack of study opportunities is a source of frustration for interviewees, and it may be remedied by investing in professional development. Workers desire advancement and recognition based on merit, as seen by their admiration for those in positions of authority. Recognition occurred in two quadrants of the map (needs and what you hear), emphasizing a key component of gamified training. The fondness for games, football (the most often reported modality), and sports suggests potential themes for gamified training. The "what you hear" and "what you see" quadrants revealed that construction workers rely on their peers for inspiration and advice, emphasizing the importance of interpersonal relationships.

Game Preferences and the Most Common Player Styles

We discovered that workers are familiar with games, potentially indicating a positive attitude towards gamification. Sports-related games emerged as the most frequently suggested themes, a fitting theme for gamified training that aligns with the findings of the empathy map. Team activities are popular among workers, particularly on construction sites where group labor is common. This conclusion supports the empathy map findings, which revealed positive interpersonal interactions among coworkers. This gives crucial information for developing the player engagement model [12] which outlines how employees will interact with gamified training.

Figure 1. Empathy map.



Source: Lima [20].

In this case, respect for team play may signal a willingness to explore more collaborative ways, and any rivalry should take place between work teams rather than individual employees. Workers preferred physical games to online games. This study might suggest that, while workers enjoy games in general, they have a specific allergy to electronic games. When designing gamified training for employees, note that gamification works in both analogue and digital forms and does not require technology for delivery [11]. It is vital to take a more analogue approach, particularly when it comes to workers' daily tasks and the physical surroundings of the construction site, but this does not exclude the use of digital technologies to enhance gamified training, such as screens that display game-specific information.

According to Bartle's Archetypes [13], the most prevalent player styles identified in the employee sample were Socializer (66.6%) and Explorer (33.3%), and this finding, together with the replies concerning gaming preferences, was statistically significant. Based on these findings, we may emphasize game components that enable players to interact with the game (explorer archetype) and with other players (socializer archetype), both of whom value connection. Furthermore, player involvement in the gaming environment is important because Explorers value the opportunity to learn how the game works; thus, they prefer the trip and experience over victory. That is why feedback, which shows the user's progress, and challenges, which motivate the player to succeed, are essential. Regardless of the player typology, feedback and challenges are vital in gamified training since they may rectify mistakes while also acknowledging accomplishments, allowing the player to alter their behaviors and grow closer to the defined objectives.

To Pink [19], including these factors may help raise players' intrinsic motivation through

mastery, which is the drive to improve in a certain area. These two game elements can also positively impact the construction site by addressing a lack of feedback from the tactical team to the workers. This issue has been identified by Leite and colleagues [1,21] and Lima and colleagues [18] as a recurring problem that negatively impacts the worker's motivation and professional development, hindering their ability to acquire new knowledge, skills, and attitudes. Furthermore, it may be necessary to include game components that serve as evolution markers so that the Explorer understands how the game works, such as levels, which are numerical representations of the player's evolution; achievements, which are rewards for completing activities; and badges and medals, which are visual representations of game achievements. To encourage player interaction, which is what socializers desire, game components such as the social graph, which allows you to see friends who are also playing the game; a private channel (chat) for player interaction; and gifts or donations, which allow you to distribute items or virtual currency to other players, are recommended.

According to Burke [12], it is recommended to use game mechanics that promote cooperation and competition in a balanced manner because a highly competitive structure, in addition to not stimulating the two dominant archetypes in this sample, is unsuitable for gamified training, which aims to train the greatest number of workers. The Empathy Map provided useful insights into how three game dynamics used to depict player-game mechanics interactions: narratives, emotions, and relationships. As previously said, it discovered that construction workers were highly interested in sports, particularly football, which provided a chance to craft a story around this subject that may elicit emotions and foster good ties among workers. Football may be used to create a tale that fosters collaboration by separating employees into teams while also providing a good dose of competitiveness to motivate them to meet the goals of gamified training.

According to Werbach and colleagues [22], collaboration is a valuable resource that may be strengthened by structuring groups of people to work toward a shared objective. To make the story connect with and make sense to the workers, football must be linked to the building site backdrop. Stories are also an essential component of gamification apps because they may alter the meaning of real-world activities by providing a narrative "overlay" [24]. Another important aspect of stimulating players' intrinsic motivation through purpose is linking the narrative to the achievement of meaningful goals larger than the players themselves, as well as using gamification to motivate people not only to achieve the organization's goals but also their own [1,12,21,23].

Given the qualities of the Explorer and Socializer archetypes, giving status and access incentives [7], might be an attractive technique. Status incentives include points, badges, levels, and ranks, which give the player prominence and acknowledgement.

In the case of the workers in this study, the empathy map revealed that people like notable personalities who achieve in their industries and are acknowledged for their contributions, implying that status rewards may be warmly received. Furthermore, because it has been discovered that workers value professional development and see a lack of study or qualification in the area as a barrier, it is proposed that a certificate be made available at the end of the course not only to demonstrate participation but also to recognize those who performed best in the gamified training. Medals can be awarded on paper or online to players who are currently standing out, such as for completing a task or moving up. Other possibilities include a conspicuous portrait of the team leading the round at the cafeteria door, as well as applause from colleagues at important moments of recognition and a celebration at the end.

Badges are visual representations of achievements that may gained in a gamified setting [23]. It advised that rankings done by team rather than by employee to avoid shame for

failing employees or causing future dismissals. If it is necessary to provide individualized feedback to employees during gamified training, it advised that this be done in a way that protects the subjects' identities. Access incentives provide the player with access to a previously unavailable area, person, or environment [7]. The exploited and socialized characters place excellent value on this form of compensation, while the other archetypes find it appealing. A one-time session of expert guidance with a senior member of the construction site or the people management department is one example of a reward for access that may benefit the workers.

As shown in the empathy map, the workers express a desire for professional development and access to new learning opportunities that will allow them to advance in this industry; so, the advice may be appropriate in this context if all parties agree. Material and power incentives [7] which include expenses (just material ones) and necessitate institutional approval, may vary depending on the environment in which the firm receives gamified training. The physical prizes might be related to the topic of gamified training, in this example, football, or to the participants' other interests, as shown by the empathy map.

The design of gamified training should focus on voluntary participation to foster autonomy and intrinsic motivation. By adapting game elements to workers' interests and goals, the experience becomes meaningful and relevant. Additionally, it is essential to identify the most suitable teaching and learning methodologies for this audience.

Learning Styles are Common Among Construction Workers

The predominant learning style among construction workers is the accommodator, characterized by valuing concrete experience and active experimentation, according to Kolb's learning cycle. This means that these professionals learn through hands-on practice at the worksite and by exchanging experiences with more seasoned colleagues [24,25]. Therefore, it recommended that gamification strategies aligned with real worksite activities, reinforcing learning through experience [6]. If it is not possible to offer gamified training on the job, it is suggested that the practical component of courses be adapted to simulate real services, thus facilitating the transfer of knowledge to the work context. A collaborative approach is especially important, since accommodators tend to prefer learning in teams and benefit from mutual support. Finally, gamification proves effective in motivating, stimulating creativity, and fostering worker engagement by integrating playful aspects and challenges into the professional development process.

Conclusion

The lack of professional training for workers has a significant negative impact on the construction industry, emphasizing the importance of investing in training this labor force. We must tailor professional training to the individual needs of workers, utilizing teaching-learning methodologies and gamification. Investigating gamification and teaching-learning strategies revealed that gamified training for construction workers should provide practical challenges, encourage innovation, and emphasize teamwork and collaboration, with game elements that favor the Explorer and Socializer archetypes, as well as the Accommodator learning style. Finally, this article discussed the ability of workers, the building site environment, and professional training in the construction industry to engage in Training and development activities through gamification. The sample size and number of construction sites analyzed are two of the article's shortcomings. Future work may entail studying alternative building companies.

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