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REVIEW

Motivational theories in gamification design: a narrative review of constructs and game elements

Teorías motivacionales en el diseño de la gamificación: revisión narrativa de constructos y elementos de juego

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ABSTRACT

Gamification applies game design elements outside games, and its effects on motivation range from positive to null or adverse. This narrative review examined which motivational theories have been used to explain and design gamification and how their constructs map onto game elements. Self-determination theory had the most explicit mapping: badges, leaderboards and performance graphs related to competence, and avatars, stories and teammates to relatedness, whereas autonomy was rarely affected. Goals and feedback were the most common elements in physical activity interventions, with modest gains. Flow was measured mainly by surveys, and personalization did not alter it in the one experiment located. Competition raised physical activity in two randomized trials, but rank, task and user orientation changed its motivational meaning. Extrinsic rewards undermined free-choice intrinsic motivation in a meta-analysis, although points and levels raised behavior in trials that paired them with goals. The theories converge on competence and feedback and diverge on extrinsic incentives. Transferability to Latin America remains untested.

Keywords: gamification; motivation; self-determination theory; game design; user engagement.

RESUMEN

La gamificación aplica elementos de diseño de juegos fuera de los juegos, y sus efectos sobre la motivación van de positivos a nulos o adversos. Esta revisión narrativa examinó qué teorías motivacionales explican y orientan el diseño de la gamificación y cómo sus constructos se vinculan con los elementos de juego. La teoría de la autodeterminación presentó el vínculo más explícito: insignias, tablas de clasificación y gráficos de desempeño se relacionaron con la competencia, y avatares, historias y compañeros de equipo con la relación social, y la autonomía rara vez se modificó. Las metas y la retroalimentación fueron los elementos más comunes en intervenciones de actividad física, con mejoras modestas. El flujo se midió principalmente con encuestas, y la personalización no lo alteró en el único experimento localizado. La competencia aumentó la actividad física en dos ensayos aleatorizados, pero la posición, la tarea y la orientación del usuario cambiaron su significado motivacional. Las recompensas extrínsecas debilitaron la motivación intrínseca en un metaanálisis, aunque los puntos y los niveles aumentaron la conducta en ensayos que los combinaron con metas. Las teorías convergen en la competencia y la retroalimentación y divergen en los incentivos extrínsecos. La transferibilidad a América Latina sigue sin ponerse a prueba.

Palabras clave: gamificación; motivación; teoría de la autodeterminación; diseño de juegos; compromiso del usuario.

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INTRODUCTION

Gamification is commonly defined as the use of game design elements in non-game contexts.(1)Applications reach from education and training to health, employee engagement, crowdsourcing and marketing.(2)The definition has been refined to stress the experiential nature of the phenomenon and the psychological mediators that connect an element, such as a point or a badge, with an outcome.(3)A review of 819 studies located education, health and crowdsourcing as the most common contexts, and points, badges and leaderboards as the most common implementations.(4)The same review reported that results lean toward positive findings, but that mixed results are numerous.(4)

The size of those effects depends on the outcome and the design. A meta-analysis of gamified instruction obtained small effects on cognitive (g = 0.49), motivational (g = 0.36) and behavioral (g = 0.25) learning outcomes, and the motivational and behavioral effects were less stable when only rigorous studies were retained.(5) Another meta-analysis of academic performance documented a medium overall effect (Hedges' g = 0.504, 95% CI 0.284 to 0.723).(6) In health and well-being, 59% of 19 empirical papers reported positive effects and 41% mixed effects, with evidence of mostly moderate or lower quality.(7) Earlier syntheses had already concluded that effects depend greatly on the context and on the users.(8)

A recurring explanation for this heterogeneity is the weak theoretical grounding of the field. Gamification research has been described as lacking coherence in research models and consistency in theoretical foundations,(4)and surveys point to diverse or unstated theoretical foundations and incongruities among empirical findings.(9)A systematic review of theory use identified 118 different theories across gamification, serious games and game-based learning.(10)An editorial overview of the field called for a wider use of theory to account for the complexity of human behavior.(11)Among the lenses applied, self-determination theory, flow theory and the mechanics-dynamics-aesthetics framework were documented as the most beneficial in a mapping of gamification research.(12)

Motivation research outside gamification offers a set of theories that can be examined construct by construct: self-determination, expectancy-value, social-cognitive self-efficacy and goal orientation, among others,(13) together with goal-setting theory,(14) social comparison theory (15) and behavior analysis.(16) How these accounts translate into design decisions, and what empirical work published between 2010 and 2023 shows for each, was not found organized in a single dimension-by-dimension synthesis. The objective of this review was to synthesize the motivational theories that underpin gamification design and the empirical evidence that links their constructs to game elements, in five dimensions, and to integrate them into design implications and a discussion of transferability to Latin America.

DEVELOPMENT

Self-determination and psychological needs

In this dimension, the central claim is that three innate needs, competence, autonomy and relatedness, yield enhanced self-motivation when satisfied and diminished motivation and well-being when thwarted.(17) Self-determination theory separates autonomous motivation, controlled motivation and amotivation as predictors of performance and well-being.(18) Meta-analytic evidence from organizations indicates that intrinsic motivation is the most important type for employee well-being, attitudes and behavior, whereas identified regulation predicts performance more strongly.(19) Applications to work have been reviewed for both established and technology-driven settings.(20,21)

Controlled experiments have attached specific elements to specific needs. Badges, leaderboards and performance graphs increased competence satisfaction and perceived task meaningfulness, whereas avatars, meaningful stories and teammates affected relatedness.(22)Perceived decision freedom, the autonomy-related outcome, could not be affected as intended.(22)A series of three online experiments with 440 participants yielded higher motivation and performance with more game elements, a curvilinear pattern that suggests a threshold, and a reading of competence and relatedness as core mechanisms.(23)A survey of 1,500 university respondents in Malaysia associated nine game design elements with autonomy, competence and relatedness satisfaction and with intrinsic motivation for energy conservation.(24)

The longitudinal and qualitative evidence presents a less uniform picture. Over 15 weeks, autonomous motivation of 40 students showed an initial decline followed by an upturn, while

controlled motivation remained stable.(25) The qualitative companion analysis described an ambivalent power of game elements, which afforded autonomy, competence and relatedness in some cases and thwarted them in others depending on situational factors.(26) A workplace survey of 291 employees indicated that extrinsic motivation lowered autonomy and competence satisfaction unless it was internalized as personal value.(27) In a field experiment with 384 students, gamified workshops showed a stronger link between intrinsic motivation, measured as enjoyment and curiosity, and attitude and behavioral intention.(28) Among 938 Stack Overflow developers, intrinsic motivation predominated despite gamified incentives, and competence and autonomy satisfaction were associated with more and better contributions.(29)

Moderators of the need-based effect have been examined at the level of meta-analysis. In gamified learning, the inclusion of game fiction and of social interaction moderated the effect on behavioral outcomes, and the combination of competition with collaboration was particularly effective.(5)These moderators map onto the relatedness need, which the controlled experiment attached to avatars, stories and teammates.(22)In health, a review of 19 empirical papers noted a lack of comparisons between gamified and non-gamified versions of the intervention, which weakens inferences about need satisfaction as the mechanism.(7)

Design-oriented work has converted these findings into tools. An analysis of 208 apps identified 12 design features and classified them according to the theory,(30) and a framework linked common game elements with its components as motivational affordances.(31) A critical paper argued that many applications use incorrect or specious interpretations of the theory, with risks for the well-being of users.(32) A neurobiological alternative proposed that structuring evaluation to reduce failure and repeat opportunities for success, as gamification does, may support learning even without intrinsic motivation.(33) In relation to the other dimensions, needs satisfaction served as the explanatory layer in most of the controlled studies located (Table 1).

Goals, feedback and self-efficacy

Within this component, goal-setting theory rests on the effectiveness of specific, difficult goals,(34)and its authors summarized the core findings, mechanisms and moderators after 35 years of research.(14)Later summaries describe goals as related to self-efficacy and generalizable across people, tasks, countries and goal sources.(34,35) Since 1990 the theory has distinguished performance goals from learning goals, and in physical activity promotion performance goals can even be detrimental for inactive individuals, for whom learning goals may be preferable.(36) Self-efficacy, defined as judgments of one's capability to perform given actions, links goal setting and feedback to motivation,(37)and in academic settings task-specific measures predicted outcomes better than global ones.(38)Expectancy-value and goal orientation theories complete the set of learning-motivation accounts.(13)

The goal-setting reading of leaderboards came from an explicit theoretical link between leaderboard features and goal-setting research.(39)Where such a link is not stated, as in physical activity studies in which only half of the designs used theories or principles,(40) goal elements work as a design habit more than as a test of the theory. The empirical link with game elements is clearest in health interventions. In a systematic review of 50 studies on mHealth gamification for physical activity, goal setting was the most common element, followed by progress bars, rewards, points and feedback, and half of the studies used theories or principles in their design.(40)The review concluded that gamification could raise participation, although results were mixed and changes modest.(40)A randomized trial of 602 overweight and obese adults, in which participants selected a step goal and earned points and levels, obtained increases in daily steps in the competition (adjusted difference 920 steps), support (689) and collaboration (637) arms.(41)In 361 adults with uncontrolled diabetes, the support and competition arms increased steps over one year, whereas weight and hemoglobin A1c did not differ from the control group.(42)

Studies in education and consumer settings add feedback and progress information as design principles. An experiment with 505 participants observed significant motivational gains for the progress bar, narrative, feedback and badges when each was added individually.(43)A leaderboard linked conflict, rules and goals, and assessment to time-on-task, and students with a leaderboard interacted with their project about 30 more times on average.(39) Leaderboard design principles were proposed on the premise that rankings help learners to set goals.(44)In a field study and a simulation, social interaction, sense of control, goals, progress tracking, rewards and prompts promoted hope and customer engagement, and hope was more strongly associated with engagement than compulsion.(45) A survey of 1,066 users of fitness apps found that goal setting and self-efficacy predicted usage behavior, but self-monitoring did not.(46)

Qualitative work on a gamified pedagogy documented higher intrinsic motivation and self-efficacy among interviewed system administration students.(47)A review of theory use summarized that gamification can illustrate goals and their relevance, give immediate feedback and simplify content into manageable tasks.(10) A theory of gamified learning describes how game attributes change learner behaviors and attitudes, which then influence learning by mediating or by moderating the effect of instructional design.(48)In relation to the needs-based dimension, goal and feedback elements act mainly on perceived competence, a mapping that most designs state implicitly and that few tested directly (Table 1).

Flow and gameful experience

In the dimension of flow, the construct is operationalized through the components that were measured in a school experiment: challenge-skill balance, merging of action and awareness, clear goals, feedback, concentration, control, loss of self-consciousness and autotelic experience.(49) Gamification is described as an attempt to invoke positive experiences such as the flow state, and a conceptual framework presents gameful experience as the process that connects the elements with experiential value.(49,50) A survey of gamification approaches in learning examined them in the context of motivational psychology and pedagogy and described gameful design as an emerging direction.(51)Flow theory was among the three lenses most widely reported in a mapping of gamification research.(12)

The measurement of flow in gamified settings was heterogeneous. Studies modeled flow as an antecedent of engagement,(52) as a companion of aesthetic experience(53)and as a multi-component outcome of personalization.(49)Because these studies involved different populations, a one-week field app, a workplace system and a school experiment, a single meaning of flow in gamification cannot be inferred from them.

Empirical studies of this construct rely heavily on surveys and structural models. In a field study of 387 participants who used a gamified app for one week, flow was associated with customer engagement, which in turn was associated with the perceived value of the sustainable behavior and with intentions to continue using the app.(52) Among 178 users of a gamified information system in a consulting firm, both flow and aesthetic experience explained continuance intention, but aesthetic experience was more salient.(53) A meta-analysis of 54 studies indicated that attitude, enjoyment and usefulness were the most relevant predictors of the intention to use gamification.(54)

Experimental tests are scarcer and less supportive. A within-subject experiment with 121 elementary school students observed no main effects of personalization on flow experience, enjoyment or motivation, although students who preferred multiplayer play showed high flow in both versions.(49)In two experiments with an n-back task, game elements did not improve accuracy directly but reduced task disengagement, prevented positive affect from dropping and lowered the motivational conflict and subjective effort experienced.(55)These results suggest that gamification may act on the experience of a task before it acts on its performance, an interpretation limited by the use of a single cognitive task.

The relation of flow to other dimensions runs mainly through feedback and goals, since clear goals and feedback are listed among the components of flow.(49)Measurement remains the main gap: flow was assessed with self-report instruments in the studies located, and the physiological or behavioral markers that would separate flow from enjoyment were not documented in the abstracts reviewed (Table 1).

Social comparison and competition

In the dimension of social comparison, the founding hypothesis states that people have a drive to evaluate their abilities and, when performance is unambiguous, do so by comparing it with the performance of others.(15)A meta-analysis of more than 60 years of research found a strong preference for upward comparison targets when there was no threat, and contrast as the dominant reaction to comparison, particularly for ability estimates.(56)Contrast means that an upward target tends to lower self-evaluation, a point with direct consequences for leaderboards.(56)A review of theory use noted that social gamification elements may enable social comparison and connect users who support each other.(10)

Randomized evidence on social designs is mixed. In the trial with overweight adults, competition produced the largest increase in daily steps (adjusted difference 920) and was the only arm that remained significantly above the control during follow-up.(41)In adults with diabetes, competition and support increased steps but collaboration did not.(42)A meta-analysis of gamified learning indicated that competition combined with collaboration was particularly effective

for behavioral outcomes.(5)A dashboard that showed students their performance next to that of peers with similar goal grades, selected to elicit slight upward comparison, promoted extrinsic motivation and higher achievement.(57)

Studies of ranking and its design qualify the benefit. In a crowdsourcing task, high leaderboard positions induced complacent behavior, low positions intensified effort, and neither pattern appeared intrinsic.(58) In a cross-over trial with 48 medical students, a competitive quiz game showed no benefit for risk competence or intrinsic motivation, and most students disapproved the competitive concept.(59) Badges and leaderboards did not affect academic performance in two online physics courses, although most students viewed them positively.(60) A qualitative study with 1,898 participants found that competition, social comparison and cooperation could simplify behavior and create accountability, but also create tension, reduce self-confidence and threaten privacy.(61)

Design guidance for educational leaderboards recommends using macro and micro leaderboards together and incorporating all measures of achievement into the micro leaderboard.(44) The recommendation was derived from an analysis of earlier work and of cases, not from a trial.

Individual differences enter this dimension through user typologies. Among 331 participants, the Socializer orientation was positively associated with social designs and negatively with performance designs, but the study found no comprehensive and consistent pattern across orientations.(62) A cross-sectional study with 86 students linked five user types with six online learning activities,(63) and a review of 42 studies on tailored gamification reported that most work modeled player preferences for future personalization.(64) In relation to the reinforcement dimension, a critical account argued that competition, rewards and the quantification of behavior can capture play in the service of managerial optimization (65) (Table 1).

Reinforcement, rewards and behavioral design

Behavior analysis contributes the idea that successful elements of game design can be used to change socially significant behavior, and examples cover health behavior, energy consumption and academic performance.(16)A systematic review of theory use derived the principles that gamification can nudge users through guided paths, reinforce good performance and simplify content to manageable tasks.(10) The counterpart is the evidence on rewards. A meta-analysis of 128 experiments found that engagement-contingent, completion-contingent and performance-contingent rewards undermined free-choice intrinsic motivation (d = -0.40, -0.36 and -0.28), while positive feedback enhanced it (d = 0.33).(66)

The scale of the issue is set by meta-research: points, badges and leaderboards persist as the most common way of implementing gamification, so the question of contingent rewards applies to most of the literature.(4)

Behaviorally designed interventions use points and levels as the reinforcing consequence. The trials in adults with excess weight and with diabetes combined step goals with points and levels informed by behavioral economics, and both yielded increases in physical activity.(41,42) In the diabetes trial, no arm differed from the control group in weight or hemoglobin A1c.(42)In the physical activity review, rewards and points were among the five most common elements, and the changes attained were modest.(40)The review of gamification in health and well-being documented clearer results for health behaviors than for cognitive outcomes.(7)

For this variable, the question is whether points and badges are sufficient. A description of pointsification states that adding points and badges alone is a misuse of the concept, which produces confusion and mixed results, although studies have also shown that points can improve engagement and motivation.(67) In the experiment with four elements, each of progress bar, narrative, feedback and badges produced motivational gains, and not all elements benefited from combination in the same way.(43)Removing elements from an ongoing task did not reduce performance in the multi-experiment study of element quantity.(23)Among Stack Overflow developers, those with stronger motivation to gain gamified rewards had higher intrinsic and integrated motivation, while more experienced developers were less motivated by such incentives.(29)

The negative side is documented in work settings. Two field experiments and interviews with frontline employees found negative impacts of gamified work on engagement and well-being, moderated by the employees' willingness to participate.(68)Surveys of the field also record diverse or unstated theoretical foundations and contradictions among empirical findings.(9,69) Table 1 summarizes constructs, game elements and the support located for each of the five dimensions (Table 1).

Relations among dimensions

The dimensions are not independent in the studies reviewed. Goals and feedback were the elements used to operationalize competence in most of the designs located, which is the need that badges, leaderboards and performance graphs satisfied.(22,40) Clear goals and feedback are also components of the flow experience,(49)and leaderboards combine goals, assessment and social comparison in one element.(39,44) A theory-use review concluded that most of the 118 theories share explicitly formulated or conceptual connections, from which basic principles of gamification can be derived.(10)

Table 1. Synthesis of motivational dimensions, linked game elements and the evidence located.

Dimension	Core construct	Game elements linked	Pattern of evidence
Needs and self-determination	Competence, autonomy, relatedness; autonomous versus controlled motivation(17,18)	Badges, leaderboards and performance graphs (competence); avatars, stories and teammates (relatedness) (22)	Controlled experiments, longitudinal surveys and qualitative studies; autonomy rarely affected; effects ambivalent over time(25,26)
Goals, feedback and self-efficacy	Specific goals, progress information, capability beliefs(14,37)	Goal setting, progress bars, feedback, points (40)	Randomized trials and a systematic review in health; modest and mixed gains(40,41)
Flow and gameful experience	Challenge-skill balance, absorption, enjoyment (49)	Clear goals, feedback, personalization, aesthetic design (53)	Surveys and structural models; no effect of personalization on flow in one experiment(49,52)
Social comparison and competition	Evaluation of ability against others; upward targets and contrast(15,56)	Leaderboards, peer benchmarks, cooperative and competitive structures (57)	Trials and experiments with mixed results; rank, task and user type modify the effect(58,59)
Reinforcement and rewards	Contingent consequences; rewards and intrinsic motivation(16,66)	Points, levels, badges, progress (67)	Meta-analysis of rewards negative; trials with points positive; field evidence of harm at work(66,68)

Note: SDT = self-determination theory. Evidence labels describe the designs reported in the abstracts reviewed and not a formal quality appraisal.

Conceptual definitions also link the dimensions. A service-marketing definition emphasizes affordances, psychological mediators, goals and context as four aspects of gamification,(3)so each dimension reviewed here can be read as a psychological mediator between an affordance and an outcome. The theory of gamified learning formalizes this chain, in which learner behaviors and attitudes mediate or moderate the effect on learning.(48)

The dimensions diverge on the status of extrinsic consequences. Self-determination theory and the reward meta-analysis predict a cost of contingent rewards for intrinsic motivation,(17,66) behavior analysis proposes reinforcement as a design resource,(16)and one critical account suggests that structuring success may support learning without intrinsic motivation.(33)Trials with points and levels obtained gains in behavior,(41)and a lab study of leaderboards observed motivation that did not appear intrinsic.(58)Differences in outcome (behavior versus intrinsic motivation), duration and population plausibly account for part of this divergence.

Table 2. Relations among motivational dimensions in gamification design.

Relation	Point of convergence	Point of divergence
Needs and goals	Goals and feedback act on perceived competence(22,40)	Autonomy was not affected by the elements tested (22)
Goals and flow	Clear goals and feedback are components of flow (49)	Personalization did not change flow in one experiment (49)
Social comparison and needs	Social elements relate to relatedness and competence(22,23)	Rank can induce complacency or reduce self-confidence(58,61)
Rewards and needs	Positive feedback enhanced intrinsic motivation (66)	Contingent rewards undermined it, yet points raised activity(41,66)
User traits across dimensions	Tailoring is a recurring recommendation (64)	No consistent pattern between user type and design (62)

Note: The column on divergence states the points on which the sources located disagreed or qualified one another.

Moderators cut across the five dimensions. User orientation, player type and situation chan-

ged how elements were received,(26,62,64)and context was already identified as a determinant of gamification effects in earlier reviews.(8)The number of elements also matters, since more elements gave higher benefits up to a possible threshold.(23)Table 2 gathers the convergences and divergences by relation (Table 2).

DISCUSSION

The objective of this review was to synthesize the motivational theories behind gamification design and the evidence that links their constructs to game elements. The five dimensions show that the link is explicit and tested for competence and relatedness, partly tested for goals and feedback, and weakly tested for flow. Social comparison and rewards, in contrast, show effects that change sign according to who is compared, with whom and for what.

Self-determination and psychological needs

The need-based mapping is the best supported, which agrees with the finding that self-determination theory is the most popular approach to explain the motivational side of gamification(32) and one of the three most beneficial lenses in mapping work.(12)The element-to-need pairings were obtained in a randomized study,(22)and the Malaysian survey and the Stack Overflow survey reached compatible conclusions for competence and autonomy in other contexts.(24,29) The absence of an effect on autonomy in the controlled study and the thwarting reported by participants(26) indicate that autonomy support cannot be assumed from the presence of choice-related elements.

A comparison with organizational research adds a caution. In the meta-analysis of work motivation, identified regulation predicted performance more strongly than intrinsic motivation, whereas external regulation carried well-being costs.(19)The gamification studies located reported need satisfaction, enjoyment and curiosity,(22,28) and their abstracts do not distinguish identified from intrinsic regulation, so designs aimed only at intrinsic motivation may miss the regulation that best predicts performance.

The disagreement between studies is plausibly explained by timing and context. The longitudinal data show a dip before recovery,(25)so a single measurement can capture different phases, and the work survey shows that internalization changes the sign of extrinsic motivation.(27)The critique that many applications misread the theory(32)adds a measurement reason: if autonomous and controlled motivation are not distinguished, the same gamified system may appear both to enhance and to undermine motivation. The neurobiological alternative(33)is a single theoretical proposal, and the abstracts reviewed do not report a test of it in a gamified system.

Goals, feedback and self-efficacy

Evidence for this dimension agrees with goal-setting theory in that goal setting was the most common element in physical activity gamification and produced gains.(40,41) The gains were modest, and the diabetes trial shows that behavioral changes do not necessarily translate into clinical markers over one year.(42)Updates of the theory offer a reading of this limit: performance goals, such as a step count, may be less suitable than learning goals for people new to an activity,(36)a distinction that none of the trials reviewed manipulated.

Three comparisons clarify the self-efficacy component. The hope mechanism documented for customer engagement (45) resembles the account in which capability beliefs link goal setting and feedback to motivation.(37)Task-specific measures of self-efficacy predicted academic outcomes better than global ones,(38)which implies that gamification studies should measure self-efficacy for the target task. The learning-motivation overview adds that mastery goals and performance goals arise from different mindsets,(13)a distinction that would help to decide whether a leaderboard emphasizes mastery or ranking.

The educational studies converge on feedback and progress information. Individual elements such as feedback and progress bars raised motivation in an online experiment,(43)and a leaderboard raised time-on-task by an amount that mediated academic achievement.(39)These findings coincide with the survey of fitness app users, where goal setting and self-efficacy predicted use,(46)and with the interview study that reported higher self-efficacy.(47)The qualitative design and the stated reliance on self-report limit what the latter can show, and the leaderboard effect was obtained in a single course project.

Flow and gameful experience

The findings on flow are more correlational than causal. Flow was associated with engagement and continued use in field surveys,(52,53) whereas the only randomized comparison located observed that personalization did not change flow.(49)The result that aesthetic experience was more salient than flow for continuance intention(53)questions whether absorption is the right target in workplace systems. In contrast, the n-back experiments indicate that elements can reduce disengagement and effort without changing accuracy,(55)an effect that fits the logic of an improved task experience.

The strongest implication of the flow evidence concerns what is measured. Studies that modeled flow as a mediator (52) and studies that tested manipulations(49,55) answer different questions, and combining them requires designs that manipulate an element and measure flow components within the same participants.

Conceptual contributions on gameful experience(50,51) state propositions that the empirical studies reviewed do not test directly. The meta-analytic predictors of intention, which were attitude, enjoyment and usefulness,(54)belong to a technology acceptance logic and may differ from the experience of flow. A design consequence follows: flow should be measured with validated instruments at the moment of use, and not inferred from satisfaction ratings collected afterward.

Social comparison and competition

The competition findings agree with the theory in showing a pull toward upward comparison and a risk of contrast.(56)The large competition effect in the trial of overweight adults(41)and the benefit of slight upward comparison in the dashboard study(57)show conditions in which comparison helped. The cross-over trial with medical students,(59)the crowdsourcing experiment(58)and the physics courses(60)show conditions in which it did not. The studies differ in population, duration and outcome, and these differences, not the leaderboard itself, are the more plausible explanation.

The meta-analytic finding of contrast as the dominant response to comparison(56)suggests a mechanism for the complacency and the rejection of competition documented above. A participant placed low in a ranking may experience a downward shift in self-evaluation, which would explain why the low-rank condition intensified effort without becoming intrinsic,(58)and why most medical students rejected competition.(59)The mechanism is an inference, since none of those studies measured self-evaluation directly.

Two design lessons emerge. First, the position in the ranking determines the motivational meaning: high ranks led to complacent behavior, and low ranks to persistence.(58)Second, social structure should be chosen by user and task, since cooperation helped adults with diabetes less than competition(42)while a meta-analysis found the combination of competition and collaboration particularly effective for behavioral outcomes.(5)Qualitative reports of tension, lower self-confidence and privacy concerns(61)indicate that opt-out and private comparison options deserve testing. The user-type literature has not yet supplied a rule for matching, since the associations observed were not consistent.(62,64)

Reinforcement, rewards and behavioral design

The reward evidence is the point of sharpest disagreement. The meta-analysis of 128 experiments supports caution with contingent rewards,(66)and the Stack Overflow data show that gamified rewards coexisted with predominantly intrinsic motivation.(29)The trials with points and levels yielded behavioral gains.(41,42) These results are compatible if the outcome is behavior in a defined period and the participants hold a goal already, so that points act as feedback and not as payment, an interpretation consistent with the positive effect of feedback in the same meta-analysis.(66)

Reviews in health point the same way. Gamification showed a positive impact on health behaviors but mixed or neutral effects on other outcomes,(7)and the physical activity review concluded that increases were modest and heterogeneous across studies.(40)Taken with the reward meta-analysis, these results argue against treating points as a general-purpose motivator.

The warning against pointsification(67)and the evidence of harm in frontline work(68)set limits on the reinforcement approach. The critique of gamification as managerial control (65) goes further and treats quantification itself as the issue. Comparison with the behavior-analytic proposal(16)shows that the two views differ on who defines the contingencies and for whom. Ethical reflection on the use of game design elements in serious domains has been called for,(11)and it applies to reward systems with particular force.

Joint reading of the dimensions

Taken together, the dimensions point to competence and informative feedback as the most consistent mechanism, to relatedness as dependent on social structure, to autonomy as the least manipulated construct, and to extrinsic consequences as context dependent. This reading agrees with reviews that found positive but mixed effects(4,7,8)and with meta-analyses that obtained small to medium effects.(5,6) It extends them by tying the heterogeneity to specific constructs and not only to context. Zainuddin and colleagues likewise called for re-examining the theoretical foundations of gamification,(69)and the five dimensions offer a way to do so. They also cover most of the principles that a review of theory use derived: showing goals, nudging through guided paths, immediate feedback, reinforcement, adaptation to ability and social comparison.(10)

Limitations

The review has limits that affect interpretation. Selection was non-systematic and rested on abstracts, so statements about study results could miss qualifications in the full texts, and a full-text appraisal of the 2020 to 2023 trials would test them. Four bibliographic sources were searched, and sources specialized in education or psychology were not, which could be addressed by repeating the searches in PsycINFO and ERIC. The evidence base is dominated by short experiments, surveys and self-reports, and long-term follow-up is rare, so that a registered protocol with at least six months of follow-up should be prioritized. Dimensions were separated for clarity although the studies measure several constructs simultaneously, which may be corrected in later work by coding each study for all constructs it measures. Most of the retained works come from authors affiliated in Europe, North America, Australia and Asia, with three works including authors affiliated in Brazil,(49,62,64)which limits statements about Latin America. Preprints and gray literature were not sought.

Implications for design and for Latin America

Personalization is a separate implication that the evidence supports only partly. Reviews of tailored gamification and studies of user orientation recommend adapting elements to users,(62,64) yet the experiment on personalized gamification observed no main effect on flow, enjoyment or motivation.(49)Tailoring is therefore best treated as a hypothesis to be tested, not as a default.

Four further implications follow. Designers can state, for each element, the construct targeted and the measure that will show whether it worked, following the need-based framework and the app taxonomy.(30,31) Elements can be tested one at a time before being combined.(23,43) Competition can be offered with a choice and with attention to rank, particularly in education and clinical training.(58,59) Rewards can be framed as positive feedback, which enhanced intrinsic motivation in the reward meta-analysis,(66)and goals for people new to an activity can be set as learning goals.(36)

Transferability to Latin America cannot be established from this body of evidence. The mechanisms discussed rest on psychological constructs that the theories treat as general, as goal-setting research reports generality across countries,(35)but the gamification experiments located were not run in Latin American samples as far as their abstracts show. Cultural attitudes toward competition, connectivity constraints and trust in data collection could alter results. Pilot trials in Latin American classrooms and clinics that measure need satisfaction and compare competitive and cooperative variants would provide the first direct test.

CONCLUSIONS

Self-determination theory provides the most explicit mapping between game elements and psychological needs, with competence and relatedness supported and autonomy rarely affected.

Goals, feedback and self-efficacy underlie the most frequent elements in health gamification, whose gains in behavior are modest and not always reflected in clinical markers.

Flow and gameful experience are mostly evidenced through surveys, and their causal link with specific elements remains unconfirmed.

Social comparison and competition can raise or lower motivation depending on rank, task and user, so that their use requires testing in each setting.

Extrinsic rewards cause a measurable cost to free-choice intrinsic motivation in experimental evidence, yet points and levels raised behavior in trials that paired them with step goals.

Taken together, the theories converge on competence and informative feedback and diverge

on extrinsic incentives, and designs should state the construct targeted by each element and be tested in Latin American settings before transfer is assumed.

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