

The Effect of Gamification in Physical Education on Motivational Indicators and Perceived Competence among Lower Secondary School Students

Behzad. Behzadnia^{1*}, Sameen. Ameen Abdullah², Mahta. Eskandarnejad³

¹ Associate Professor, Department of Motor Behavior, Faculty of Physical Education and Sport Sciences, University of Tabriz, Tabriz, Iran

² Ph.D. Student in Motor Behavior, Faculty of Physical Education and Sport Sciences, University of Tabriz, Tabriz, Iran

³ Professor, Department of Motor Behavior, Faculty of Physical Education and Sport Sciences, University of Tabriz, Tabriz, Iran

* Corresponding author email address: behzadnia@tabrizu.ac.ir

Editor

Gholamreza Rajabi^{id}
Professor of Counseling
Department, Shahid Chamran
University, Ahvaz, Iran
rajabireza@scu.ac.ir

Reviewers

Reviewer 1: Mohammadreza Zarbakhsh Bahri^{id}
Associate Professor, Department of Psychology, Tonekabon Branch, Islamic Azad
University, Tonekabon, Iran. Email: M.Zarbakhsh@Toniau.ac.i

Reviewer 2: Zahra Yousefi^{id}
Assistant Professor, Department of Psychology, Khorasgan Branch, Islamic Azad
University, Isfahan, Iran.
Email: yousefi1393@khuif.ac.ir

1. Round 1

1.1. Reviewer 1

Reviewer:

The theoretical discussion in the paragraph beginning with “One of the most influential frameworks for understanding motivation in educational and physical activity settings is self-determination theory” is generally sound, but the manuscript should more explicitly distinguish motivational regulations according to the self-determination continuum. At present, intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation are described individually, yet the theoretical distinction between autonomous and controlled motivation is not fully operationalized in relation to the study hypotheses. The authors should clarify why gamification was expected to influence each regulation differently. In particular, because gamification includes points, rewards, levels, and unlocking mechanisms, the manuscript should acknowledge that such elements may potentially increase externally controlled motivation unless they are implemented in an informational, autonomy-supportive manner. This theoretical tension is central to the study and should be articulated before the hypotheses or study aim.

The paragraph stating that “Among these psychological needs, perceived competence is especially salient in physical education because students are frequently required to perform observable motor tasks in front of peers” provides a convincing conceptual basis for perceived competence; however, the manuscript should distinguish perceived competence from objectively assessed motor competence. The current study assessed students’ subjective perceptions of basketball ability through a three-item self-report scale rather than actual basketball proficiency. This distinction should be made explicit in the Introduction and maintained consistently throughout the manuscript. Statements implying that gamification improved “basketball competence” should be revised to “perceived basketball competence” unless objective performance data are available. This clarification is particularly important because students may perceive themselves as more competent without demonstrating equivalent improvements in technical basketball performance.

The paragraph beginning with “Gamification generally refers to the intentional use of game-design elements and game-like structures in non-game contexts” should provide a more precise operational definition of gamification and distinguish it from game-based learning. The intervention used a narrative, avatars, points, levels, challenges, cooperation, and unlocking mechanisms while the underlying instructional content remained basketball skill practice. This is consistent with gamification rather than game-based learning, but the distinction should be stated explicitly because these concepts are frequently conflated in educational research. The authors should also explain how the intervention corresponds to the dynamics, mechanics, and components framework attributed to Werbach and Hunter. Mapping the major intervention elements onto those three categories would enhance conceptual clarity and intervention replicability.

The paragraph describing the “Self-Regulation Questionnaire in Physical Education developed by Goudas et al. (1994)” requires additional psychometric clarification. The reported Cronbach’s alpha coefficients were .72 for intrinsic motivation, .71 for identified regulation, .71 for introjected regulation, .68 for external regulation, and .84 for amotivation. The authors describe these as “moderate to satisfactory,” but the reliability of the external regulation subscale (.68) is below the conventional .70 threshold. The manuscript should acknowledge this limitation and avoid overstating reliability. It would also be useful to report confidence intervals for reliability coefficients or an alternative coefficient such as McDonald’s omega if item-level data are available. Because the intervention effect was significant specifically for external regulation, the comparatively weaker reliability of that subscale is particularly relevant to interpretation.

The paragraph describing perceived competence states that it was assessed using “an adapted three-item perceived competence scale previously employed in related studies.” The adaptation procedure requires fuller description. The authors should specify whether the original instrument was formally translated into Persian, whether forward and backward translation procedures were used, whether content validity was assessed by experts, and exactly how the wording was adapted to basketball. Because the scale contained only three items, evidence of construct validity in the current sample would also be valuable, although sample size may constrain factor analysis. At minimum, all three items should be reported in a supplementary file or appendix so that readers can evaluate construct coverage. The current description provides only one example item and is insufficient for complete replication.

Authors uploaded the revised manuscript.

1.2. Reviewer 2

Reviewer:

The literature review paragraph beginning with “A growing body of research supports the educational potential of gamification in physical education, but findings remain heterogeneous” should be revised to make the research gap more systematic. The manuscript currently identifies several limitations in previous literature, including differences in age groups, technology-based interventions, and outcome measures, but the precise novelty of the present study is somewhat dispersed across several paragraphs. The authors should formulate a concise gap statement indicating that relatively limited evidence exists regarding curriculum-integrated, non-digital gamification among lower-secondary-school girls, particularly when distinct forms of motivational regulation and perceived competence are examined simultaneously. Establishing this gap explicitly would better justify the study design and prevent the Introduction from becoming predominantly descriptive.

The final sentence of the Introduction states, “Given these theoretical considerations, prior empirical findings, and remaining gaps, the present study aimed to investigate the effect of gamification-based physical education on motivational indicators and perceived competence among seventh-grade female lower secondary school students.” Although the aim is clear, the manuscript would benefit from explicitly stated hypotheses immediately before or after this sentence. Based on self-determination theory and the cited literature, the authors should specify whether they expected gamification to increase intrinsic motivation and identified regulation, decrease external regulation and amotivation, and improve perceived competence. A priori hypotheses are especially important because the study includes five motivational dimensions and one competence outcome, and their absence makes it difficult to determine whether the analyses were confirmatory or exploratory.

In the Methods paragraph beginning with “The present study was an applied, quasi-experimental investigation employing a pretest–posttest design with an experimental group and a control group,” the classification of the study as quasi-experimental should be explained more carefully. Two intact classes were selected and subsequently assigned to conditions, meaning that individual students were not randomized. The authors should therefore clarify that allocation occurred at the class level rather than the individual level. This design introduces potential cluster effects because students within the same class share instructional and social environments. With only one class per condition, treatment effects are completely confounded with class effects. This constitutes an important methodological limitation that should be acknowledged explicitly, as differences attributed to gamification could theoretically reflect pre-existing classroom-level characteristics even if baseline outcome scores were statistically comparable.

The participant-selection paragraph reports that the experimental group initially included 34 students and the control group 29 students, after which “one participant from the experimental group and two participants from the control group were excluded because they did not participate in the posttest assessment” and an additional four cases were removed as outliers. The authors should provide considerably greater detail regarding the outlier procedure. Specifically, the manuscript should state the statistical criterion used to identify outliers, the variables on which they were detected, whether they were univariate or multivariate outliers, and whether sensitivity analyses retaining these observations produced materially different results. Removing four participants from a relatively small initial sample can meaningfully affect estimates, p values, and effect sizes. Outlier exclusion should therefore be based on an explicitly prespecified and defensible criterion rather than an unspecified judgment.

The inclusion and exclusion criteria in the Study Design and Participants section require further methodological justification. The manuscript states that students with “disorders such as attention-deficit or hyperactivity-related problems” were excluded, yet it does not indicate how these conditions were assessed. The authors should clarify whether eligibility was determined through school health records, parental report, formal diagnosis, or researcher screening. Similar clarification is needed for cardiovascular, respiratory, physical, and motor conditions. Because these criteria involve health-related judgments, the screening procedure should be described precisely. Moreover, the authors should explain why attention-deficit/hyperactivity-related conditions were considered exclusion criteria for a pedagogical gamification study, particularly because gamified instruction might plausibly be relevant to students with attentional difficulties.

The Methods section should report ethical procedures more comprehensively. Although the manuscript states that parental consent was an inclusion criterion and that permission was obtained from the provincial Department of Education, there is no explicit description of research ethics approval, informed assent from the students, confidentiality procedures, or the voluntary nature of participation. For research involving 13-year-old school students, ethical reporting should include the name of the approving institutional ethics committee, approval code if available, parental or guardian informed consent, student assent, confidentiality protections, and confirmation that refusal or withdrawal had no effect on school assessment or physical education participation. This information is necessary for compliance with contemporary standards for research involving minors.

Authors uploaded the revised manuscript.

2. Revised

Editor's decision after revisions: Accepted.

Editor in Chief's decision: Accepted.