



Enhancing Self-Esteem, Satisfaction, and Motor Skills through Gamification in Elementary Physical Education

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Abstract

Objectives. This study aimed to investigate the impact of gamification in physical education on enhancing the self-esteem, satisfaction, and motor skills of 7-9-year-old elementary school students.

Materials and methods. This study employed a pre-experimental method using a one-group pretest-posttest design without a control group. The participants were 90 elementary school students aged 7-9 years in Salatiga City (Indonesia), selected through purposive sampling. The research instruments included self-esteem, sports satisfaction, and motor skills assessment tools that have been validated and tested for reliability. The gamified intervention was implemented in physical education instruction over eight weeks. The statistical analysis was conducted using descriptive statistics, prerequisite tests, analysis of variance (ANOVA), and paired samples t-tests.

Results. The study's findings indicate significant changes in the observed variables following the intervention, with a significance value (Sig) of $0.000 < 0.05$. The calculated t-values for all three variables were more significant than the critical t-value of 1.990, with a significance level (Sig. 2-tailed) < 0.05 . Therefore, this implies that gamification in elementary physical education instruction has a statistically significant positive impact on students' self-esteem, satisfaction, and motor skills.

Conclusions. The findings elucidate that the implementation of a gamification intervention has proven effective in enhancing students' self-esteem, satisfaction with learning, and motor skills abilities. The practical implications of these findings underscore the importance of considering the integration of gamified process into instructional design as a strategy to enhance the quality of physical education learning in elementary schools.

Keywords: self-esteem, satisfaction, motor skills, gamification, physical education.

Introduction

Physical education plays a crucial role in shaping students' physical and psychosocial well-being worldwide. With the advancements of the modern world, the challenges faced in physical education are becoming increasingly diverse, particularly at the elementary school level. One primary challenge is enhancing students' self-esteem, satisfaction, and motor skills, which are critical in fostering healthy and holistically developing individuals (Invernizzi et al., 2019). Although physical education has long been recognized as an integral part of the elementary school curriculum, innovative and practical approaches to achieving desired learning outcomes remain the research focus. In this context,

gamification emerges as a promising approach to enhance student motivation and engagement in learning through the integration of games, with the potential to improve their psychosocial well-being. However, research specifically investigating the influence of gamification in physical education among elementary school students still needs to be completed. Therefore, this study aims to fill this gap by investigating the impact of gamification implementation in physical education on elementary school students' self-esteem, satisfaction, and motor skills. By expanding the understanding of gamification potential in the context of physical education, this research is expected to provide valuable insights and significantly contribute to developing more effective and inclusive educational practices at the elementary school level.

Although physical education is widely recognized as an essential part of the elementary school curriculum, significant challenges persist in achieving desired learning

outcomes, particularly concerning students' psychosocial and motor aspects. One of the primary issues is low self-esteem, satisfaction, and motor skills among some students (Chen et al., 2017; Xue-Yan et al., 2016). Low self-esteem can negatively impact learning motivation, social interaction, and students' emotional well-being (Nguyen et al., 2019; Scherrer & Preckel, 2019). Additionally, students' satisfaction with learning also plays a crucial role in influencing participation rates and academic performance (Griebler et al., 2017). Meanwhile, underdeveloped motor skills can restrict elementary school students' participation in physical activities and sports, essential components of their daily lives (Eddy et al., 2019; Lee et al., 2020). Despite efforts to enhance these aspects through various teaching approaches, more innovative and effective strategies are still needed. Therefore, this research explores the potential use of gamification in physical education to improve elementary school students' self-esteem, satisfaction, and motor skills.

While research in physical education continues to evolve, there remains a significant gap in the literature regarding the influence of gamification in enhancing elementary school students' self-esteem, satisfaction, and motor skills. Studies specifically investigating the use of gamification in the context of physical education at the elementary school level are limited, with the majority of research focused on higher education and middle school levels (Arufe-Giráldez et al., 2022; Fernandez-Rio et al., 2022). Furthermore, research tends to be limited in geographical scope, with most studies conducted in developed countries. This limitation hinders the generalizability of research findings to elementary school student populations in various cultural and social contexts. Additionally, within the existing literature, there is a lack of comprehensive research examining the influence of gamification on motor skills, with more focus on cognitive and motivational aspects. Therefore, there is an urgent need to address this gap by conducting more in-depth and holistic research on the impact of gamification in physical education on elementary school students.

This research reflects a new and significant contribution to physical education, particularly in using gamification to enhance elementary school students' self-esteem, satisfaction, and motor skills. Although gamification has gained attention in various fields, including education, its application in physical education is relatively new and has yet to be fully explored. Focusing on the age group of 7-9-year-olds at the elementary school level, this study expands the understanding of the potential use of gamification in achieving learning objectives related to students' physical and psychosocial well-being. The uniqueness of this research lies in its holistic approach, which explores the impact of gamification on students' psychological aspects and their motor skills, which are vital components of physical development. By highlighting the novelty and importance of this research, it is hoped that the findings will contribute to developing more inclusive, innovative, and effective physical education practices at the elementary school level and inspire further research in this field.

Materials and Methods

Study Participants

The participants in this research are elementary school students in Salatiga. The research sample consists of 7-9-year-

old elementary school students selected randomly from elementary schools in Salatiga city using purposive sampling, resulting in a total sample size of 90 elementary school students.

Study Organization

This study adopts a pre-experimental method with a one-group pretest-posttest design. No control group is included in this design. Subject placement involves all elementary school students aged 7 to 9 in Salatiga who meet the age criteria. First, the students will be informed about the research objectives and procedures after obtaining permission from the schools and parents. Then, they will be asked to fill out self-esteem and satisfaction questionnaires tailored to the characteristics of elementary school students. Additionally, the researcher will conduct motor skills assessments. Subsequently, gamification intervention will be implemented in physical education instruction for eight weeks. After the intervention period, all measurement instruments will be repeated to compare changes before and after the intervention.

The research instruments consist of a self-esteem questionnaire tailored to the characteristics of 7-9-year-old elementary school students, with validity test results of 0.82 and a Cronbach's alpha reliability of 0.71. To measure satisfaction, the Sports Satisfaction Inventory (SSI) (Duda & Nicholls, 1992), adapted to physical education classes in schools (Antonio Baena-Extremera et al., 2012), and also used in previous research (Morales-Sánchez et al., 2021) to assess student satisfaction with physical education instruction. In practice, the SSI instrument underwent validity and reliability testing adjusted to the characteristics of 7-9-year-old students with more straightforward language and easier comprehension. Meanwhile, to assess students' motor skills, a performance-based motor skills assessment instrument is used with item validity of 1, validity criteria of $0.000 < 0.05$, and reliability based on Cronbach's alpha of 0.72 (Wibowo et al., 2024).

Table 1. Self-esteem instrument

Description
1. I am happy with myself.
2. I am proud of what I do.
3. I feel confident.
4. I feel valuable and important.
5. I feel comfortable with my appearance.
6. I have many friends who care about me.
7. I am happy being myself.

Table 2. SSI Instruments

Description
1. I enjoy participating in physical education classes.
2. During Physical Education class, I sometimes daydream and lose focus on what I should be doing.
3. I feel bored during physical education classes.
4. In Physical Education class, I often wish the class would end quickly.
5. Physical Education lessons are engaging.
6. When I am in Physical Education class, time flies by quickly.
7. I am active during physical education classes.
8. I enjoy physical education classes.

Table 3. Statistical Description

Variabel	N	Mean	Std. Deviation	Min	Max	Sum
Self-esteem	90	24.31	3.514	17	33	2188
Satisfaction	90	21.64	3.974	11	31	1947
Motor Skills	90	26	2.962	19	33	2340

Statistical Analysis

The statistical analysis in this research involves several approaches, namely descriptive statistical analysis, prerequisite testing, analysis of variance (ANOVA), and hypothesis testing using paired sample t-tests. Descriptive statistical analysis refers to summarizing and describing the observed data using statistics such as mean and standard deviation to provide a general overview of the data characteristics. Prerequisite testing refers to tests or analyses conducted before the primary analysis to ensure that statistical assumptions are met. This includes checking assumptions such as normality and homogeneity. Analysis of variance (ANOVA) is a statistical technique used to compare means across three or more variable groups to see if significant differences exist among the variables. Hypothesis testing using paired sample t-tests indicates that the research employs paired t-tests to test the difference between before and after treatment or intervention (pretest-posttest).

Results

The results section of this research presents the main findings emerging from data analysis related to the use of gamification in physical education learning in elementary schools. These findings provide an in-depth picture of the impact of using gamification on students' self-esteem, satisfaction, and motor skills, as well as its relevance to the research objective of improving students' holistic learning experience.

In this study, an analysis was conducted on three relevant variables, self-esteem, satisfaction, and motor skills, among a sample of 90 participants. The analysis results indicate that the observed average self-esteem is 24.31, with a standard deviation of 3.514 and a range of values between 17 and 33. Similarly, for the satisfaction variable, the recorded average is 21.64 with a standard deviation of 3.974, with a range of values between 11 and 31. Furthermore, regarding motor skills, the observed average is 26, with a standard deviation of 2.962, and it has a range of values ranging between 19 and 33. This data provides an overview of the characteristics of the variables examined within the observed sample population, which can offer valuable insights for further studies.

Table 4. Test prerequisites

Kolmogorov-Smirnov	Homogeneity
0.200	0.116

In the context of this research, the Kolmogorov-Smirnov test was used to test the normality of the data distribution, yielding a result of $0.200 > 0.05$, indicating that the data is usually distributed. Subsequently, the homogeneity test was employed to evaluate the homogeneity of variance among

the compared groups, yielding a test result of 0.116. This data provides an overview of the validity of the statistical assumptions considered in the data analysis, which is crucial in interpreting the research findings and drawing conclusions.

Table 5. Anova analysis of self-esteem, satisfaction and motor skills

	Sum of square	df	Mean Square	F	Sig.
Between groups	932.682	2	466.341	36.117	0.000
Within Groups	3447.451	267	12.912		
Total	4380.133	269			

Analysis of variance (ANOVA) tests the differences in means among two or more groups. In the context of this research, the ANOVA results indicate a significant difference in means among the compared groups, with a significance value (Sig.) of 0.000, which is smaller than the commonly established significance level (0.05). This result suggests a significant difference between the two groups.

Table 6. Paired sample statistics

Variabel		N	Mean	Std. Deviation
Self-esteem	Pretest	90	24.31	3.541
	Posttest	90	31.32	2.628
Satisfaction	Pretest	90	20.39	4.463
	Posttest	90	32.67	3.597
Motor Skills	Pretest	90	26.12	3.605
	Posttest	90	35.45	3.287

The data in Table 6 includes the pretest and posttest results of three observed variables: self-esteem, satisfaction level, and motor skills. For self-esteem, the pretest mean score is 24.31 with a standard deviation of 3.541, while the posttest mean score is 31.32 with a standard deviation of 2.628. Similarly, for satisfaction level, the pretest mean score is 20.39 with a standard deviation of 4.463, while the posttest mean score is 32.67 with a standard deviation 3.597. Lastly, the pretest mean score for motor skills is 26.12 with a standard deviation of 3.605, and the posttest mean score is 35.45 with a standard deviation of 3.287. This data provides a clear overview of the observed changes from pretest to posttest in each variable, which can offer valuable insights in evaluating the effectiveness of the given intervention or treatment.

The analysis of the difference between pretest and posttest scores for the three observed variables, namely self-esteem, satisfaction level, and motor skills, indicates

Table 7. Paired Samples test

Variabel	Mean	Std. Deviation	95% confidence interval of diffence		t	df	Sig. (2 tailed)
			lower	Upper			
Self-esteem pretest-posttest	-7.012	4.562	-7.968	-6.057	-14.593	89	0.000
Satisfaction pretest-posttest	-12.280	5.490	-13.430	-11.130	-21.221	89	0.000
Motor skills pretest-posttest	-9.338	4.855	-10.355	-8.321	-18.246	89	0.000

statistically significant differences. The average difference score between pretest and posttest for self-esteem is -7.012, with a 95% confidence interval ranging from -7.968 to -6.057. Similarly, the average difference score for satisfaction level is -12.280, with a 95% confidence interval ranging from -13.430 to -11.130. Lastly, the average difference score for motor skills is -9.338, with a 95% confidence interval ranging from -10.355 to -8.321. These results indicate significant changes in these variables after the intervention or treatment, with significance values (Sig.) smaller than the established significance level (0.05). This analysis provides crucial insights into evaluating the effectiveness of the intervention or treatment.

The data analysis indicates that the t-test values for self-esteem, satisfaction, and motor skills variables are harmful, namely -14.593, -21.221, and -18.246, respectively. This harmful condition arises from comparing the lower average pretest results and the higher average posttest results. However, in this context, negative t-test values can be interpreted positively. This is because the difference between the average posttest and pretest results indicates an improvement from the initial condition.

Furthermore, since the t-test values for all three variables exceed the critical t-value of 1.990, and the significance (Sig. 2-tailed) is less than 0.05, the null hypothesis (H₀) is rejected, and the alternative hypothesis (H_a) is accepted. Thus, there is a significant difference between the pretest and posttest results, indicating the positive influence of gamification in physical education learning on elementary school students' self-esteem, satisfaction, and motor skills.

Discussion

The implementation of gamification in elementary school physical education has been proven to have a positive impact on students' self-esteem. The analysis indicates a significant improvement in self-esteem following teaching methods involving gaming elements and competition. These findings affirm that gamification interventions can enhance students' self-esteem within the context of learning processes and participation in physical activities (Navarro-Mateos et al., 2024). The improvement in self-esteem holds important implications for building the confidence of elementary school students, motivating them to learn, and enhancing their abilities to achieve academic and social goals (Acosta-Gonzaga, 2023; Kärchner et al., 2021; Yang et al., 2019). Therefore, gamification can be considered a practical approach to strengthening elementary school students' psychological and emotional aspects.

The use of gamification in elementary school physical education has also been proven to impact students' satisfaction levels with the learning process positively. These

findings are consistent with previous research indicating that teaching methods involving gaming elements can enhance students' satisfaction with learning (Videnovik et al., 2020). The research results indicate that elementary school students are more satisfied with their learning experiences when teaching is fun and interactive (Bukit et al., 2023; Irwansyah et al., 2019). Similarly, other research findings suggest that elementary school students' satisfaction and academic performance in physical education learning can be improved through the use of technology and gaming elements in the learning process (Andrade et al., 2020; Cojocaru et al., 2022). Factors such as higher levels of engagement, enjoyment, and the challenges faced by students when learning through gamification have also been recognized by previous studies as contributing factors to increased student satisfaction with learning (Ahmad et al., 2020; Nguyen-Viet & Nguyen-Viet, 2023; Rivera & Garden, 2021). Therefore, the use of gamification in elementary school physical education not only benefits academic achievement but also enhances students' satisfaction with the overall learning process (Segura-Robles et al., 2020).

Implementing gamification in elementary school physical education has been proven to impact the improvement of students' motor skills positively. This research found that students significantly improved motor skills after being exposed to teaching methods involving gaming elements and competition. These findings are consistent with previous research indicating that fun and interactive learning approaches can effectively facilitate the development of motor skills in elementary school students (Rizqi & Sutapa, 2019). The study found that using games and physical activities in learning can enhance children's gross motor skills (Aliriad et al., 2024; Nur et al., 2020; Sutapa & Suharjana, 2019). Similarly, research results have shown that integrating gaming elements into learning can improve coordination and motor control in elementary school students (Mujriah et al., 2022; Saputra et al., 2021; Suryadi et al., 2023). Therefore, these findings affirm that gamification in physical education not only enhances students' interest and participation but is also effective in improving their motor skills.

The improvement in elementary school students' self-esteem, satisfaction, and motor skills after implementing gamification in physical education has significant implications for learning practices in elementary schools. These findings indicate that the use of gaming elements and competition facilitates academic achievement and significantly contributes to the psychological and emotional aspects of students and their motor skills and well-being. Therefore, physical education teachers are encouraged to consider integrating gamification into their lesson designs to enhance elementary school students' learning experience

and stimulate their holistic development. By adopting this approach, physical education teachers can create a more engaging, motivating, and enjoyable learning environment, which, in turn, will increase student participation and create a sustainable positive impact on academic development.

In the context of research limitations, it is essential to acknowledge that this study also has several constraints that must be considered in interpreting its results. Firstly, the research sample is limited to elementary school students in specific locations and age groups; thus, generalizing the findings to a broader population must be done cautiously. Additionally, the relatively short duration of the intervention in this study may reflect something other than the long-term effects of using gamification in physical education learning. Furthermore, measuring self-esteem, satisfaction, and motor skills was only conducted using specific instruments, which may not cover other relevant aspects important in physical education learning.

For future research, it is recommended to expand the sample coverage, both in terms of location and the age range of students, to obtain a broader generalization of the findings. Additionally, conducting long-term studies involving more intensive gamification interventions is suggested to understand their long-term effects on students' self-esteem, satisfaction, and motor skills. Furthermore, future research could also consider using various comprehensive measurement methods to gain a more holistic understanding of the impact of gamification in physical education learning. Future research is expected to provide more profound and relevant insights for developing more effective and sustainable learning practices by addressing these limitations.

Conclusions

The conclusion of this study elucidates that the utilization of gamification in physical education learning at elementary schools significantly impacts students' self-esteem, satisfaction, and motor skills. These findings align with the research objective of exploring gamification's effects in enhancing student's learning experiences and promoting their holistic development. The results of the analysis indicate that gamification interventions effectively improve students' self-esteem, satisfaction with learning, and motor skills. The practical implications of these findings underscore the importance of considering gamification integration in learning design as a strategy to enhance the quality of education at the elementary school level.

However, it is essential to acknowledge the limitations of this research in interpreting its findings. The limited research sample and short intervention duration constrain the extensive generalization of the findings. Therefore, for future research, it is recommended that the sample coverage be broadened and long-term studies conducted to understand the long-term impacts of gamification be conducted. Additionally, more comprehensive measurement methods are warranted to gain a more holistic understanding of the effects of gamification in physical education learning.

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Conflict of Interest

The authors have no conflicts of interest.

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Підвищення рівня самооцінки, задоволеності та рухових навичок шляхом гейміфікації на заняттях з фізичного виховання у початковій школі

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Авторський вклад: А – дизайн дослідження; В – збір даних; С – статаналіз; D – підготовка рукопису; Е – збір коштів

Реферат. Стаття: 7 с., 7 табл., 34 джерел.

Мета дослідження. Метою цього дослідження було вивчення впливу гейміфікації занять з фізичного виховання на підвищення рівня самооцінки, задоволеності та рухових навичок учнів початкових класів 7-9 років.

Матеріали та методи. У дослідженні застосовано передекспериментальний метод з використанням моделі одно-групового перед- і післятестового спостереження без залучення контрольної групи. У дослідженні взяли участь 90 учнів початкових класів у віці 7-9 років з міста Салатіга (Індонезія), відібраних шляхом цілеспрямованої вибірки. У ході дослідження використано інструменти для визначення рівня самооцінки, задоволеності спортом та оцінки рухових навичок, які були валідовані та протестовані на достовірність. Гейміфікована інтервенція була впроваджена в навчальний процес з фізичного виховання протягом восьми тижнів. Статистичний аналіз проведено з використанням описової статистики, тестів на відповідність умовам дослідження, дисперсійного аналізу (ANOVA) та t-критеріїв для парних вибірок.

Результати. Представлені результати свідчать про значні відмінності у спостережуваних змінних після проведення інтервенції з рівнем значущості (Sig) $0,000 < 0,05$. Розрахункові значення t-критерію для всіх трьох змінних показали більшу значущість, ніж критичне значення t-критерію 1,990, з рівнем двосторонньої значущості (Sig. 2-tailed) $< 0,05$. Отже, це означає, що гейміфікація на заняттях з фізичного виховання в початковій школі має статистично значущий позитивний вплив на показники самооцінки, задоволеності та рухових навичок учнів.

Висновки. Результати дослідження доводять ефективність впровадження гейміфікованих інтервенцій у підвищенні рівня самооцінки учнів, їхньої задоволеності навчанням та поліпшенні розвитку рухових навичок та здібностей. Практичне значення цих результатів підкреслює важливість врахування інтеграції гейміфікованого процесу у навчальний дизайн як стратегії підвищення якості навчання фізичного виховання в початкових школах.

Ключові слова: самооцінка, задоволеність, рухові навички, гейміфікація, фізичне виховання.

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