

Impact of regular team-based esports training on leadership qualities, academic performance, and social skills in university students

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ABSTRACT

The advancement of digital technologies is transforming the educational environment. Esports stands out among the digital trends that have gained international popularity. This study is based on the assumption that integrating esports with mandatory physical training enhances students' athletic performance and fosters comprehensive leadership competences and social skills. The research analyzes the impact of regular esports training on university students' leadership qualities, academic performance, and social skills. The study employed a quasi-experimental methodology involving 100 students (two groups of 50 each), using validated assessment tools for leadership qualities (MLQ Form 5X-Short) and communication skills (Communication Skills Scale). The research program included esports training with an integrated physical exercise component for 16 weeks. The results demonstrate a statistically significant improvement in transformational leadership ($p < 0.001$) and developmental leadership ($p < 0.001$) within the experimental group. A strong correlation was identified between participation in esports activities and the development of communication skills ($\rho = 0.68$, $p < 0.01$). In addition, the experimental group showed statistically significant improvements in academic performance ($p < 0.05$) and class attendance ($p < 0.05$). These results expand the theoretical understanding of esports' potential in the educational process and open new opportunities for developing innovative approaches to fostering students' leadership qualities.

Keywords: Esports, Leadership skills, Social skills, Physical fitness, Educational technology, Student sports

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Introduction

Being a social institution, the modern education system is actively searching for new effective models for student learning (Abbou [1-5]). In the context of rapid digitalization, a systemic issue has emerged, i.e., the decline in direct social interaction in real life, leading to fragmented interests and a deficit in social skill

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development [6-9]. On the one hand, modern educational models must consider the specifics of digital technologies to minimize the negative effects of digitalization and enhance the efficiency of the learning process [10-13]. On the other hand, for the development of contemporary education, it is essential to integrate digital opportunities into student learning [14, 15]. These technologies offer alternative formats for the development of personal competences and social skills [15-20].

In recent years, with the advancement of digital technologies and the transformation of the educational environment, scholars have shown interest in esports as a new form of team-based interaction. Studies indicate that esports, like traditional team sports, provides a structured environment for developing 21st-century skills [21]. In a university setting, esports creates unique opportunities for gaining leadership experience and fostering social skills, similar to conventional sports [22].

Reviews by Gervasoni and Bolesina (2021) and Reitman *et al.* (2020) demonstrate that esports can contribute to the development of teamwork and leadership skills [23, 24]. This is further supported by Qian *et al.* (2020) who identified a significant correlation between participation in organized esports programs and the enhancement of communication skills [25]. This study focuses on exploring the potential of esports activities in the context of developing leadership qualities and social skills among university students.

It becomes particularly relevant to investigate how communication experiences in an esports environment can foster the development of universal communication skills applicable in a broader social context [26-31].

Literature review

Traditionally, the development of leadership qualities and social skills in students has been associated with participation in team sports. The need to promote university team sports is justified by their comprehensive impact on student development [32-35]. Research indicates that regular participation in team sports enhances academic performance by improving time management, goal-setting, and psychological resilience [36-38]. Moreover, team sports create a structured environment for developing leadership qualities and social skills, including effective communication, conflict resolution, and strategic planning [33, 39]. Pierce *et al.* (2017) confirm that regular participation in team sports significantly improves students' communication skills and emotional intelligence [40]. Kniffin *et al.* (2015) reveal that former university sports team members show higher levels of leadership qualities and teamwork skills in their professional careers [41].

With the advancement of digital technologies, scholars have discovered that such improvements are not limited to students engaged in traditional (Olympic) team sports but also extend to those participating in team-based esports. Baxter *et al.* (2024) highlight that esports participation fosters critical thinking and teamwork, both essential for effective leadership [42]. Zhong *et al.* (2022) demonstrate that regular engagement in esports

significantly enhances leadership and communication skills, promoting social interaction and teamwork [43].

Leadership qualities

The selection of leadership assessment criteria was based on an analysis of contemporary leadership studies in the context of team-based interactions. In digital environments and esports, Freeman and Wohn (2018) demonstrated that the effectiveness of team collaboration largely depends on leadership style and the leader's ability to adapt their approach to the specifics of a virtual setting [44]. Hamari and Sjöblom (2017) highlighted the importance of structured leadership in esports teams [45]. Liu and Chang (2024) further confirmed the significance of different leadership styles for the efficiency of modern teams, emphasizing the key role of communication, strategic planning, and interpersonal relationships in leadership development [33].

It is important to clarify how leadership styles differ among scholars and how their components vary (transformational, transactional, and developmental). Transformational leadership is characterized by the ability to inspire and motivate a team by forming a shared vision and stimulating intellectual growth [42, 43]. The transactional component reflects the organizational aspects of leadership, including goal-setting, performance monitoring, and providing constructive feedback [44]. Developmental leadership focuses on creating conditions for team members' growth by supporting initiative, delegating responsibilities, and fostering a learning environment, a critical factor in team-based esports, where continuous improvement is a key to success [25]. This multidimensional model provides a comprehensive framework for assessing leadership qualities in team-based interactions, integrating strategic and operational aspects of leadership.

Academic performance

An intriguing aspect is the relationship between participation in esports competitions and academic performance. Freeman and Wohn (2018) demonstrated that students engaged in organized esports teams develop time management and coordination skills, which positively influences their academic activities [44]. Krivonogov and Ilyushin (2024) further confirm that structured esports training can significantly enhance students' social skills, foster strategic thinking, and improve time management [46]. Moderate participation in esports events, when effectively planned, may contribute to the development of cognitive skills applicable to the learning process.

Qian *et al.* (2020) and Babanova *et al.* (2024) note that engagement in esports can stimulate the development of analytical thinking and quick decision-making skills, which are particularly crucial for mastering technical disciplines [25, 47]. However, these authors emphasize the need for further research on the mechanisms by which skills acquired in esports transfer to academic performance.

Social skills

The effectiveness of interpersonal communication within esports teams is of particular interest in the context of developing students' social skills. Studies by Freeman and Wohn (2018) indicate that the virtual environment presents unique communication challenges, requiring specific competences to overcome them [44]. The distinct nature of esports communication, where participants lack access to body language, facial expressions, and other nonverbal cues combined with the need for rapid coordination in high-uncertainty conditions, imposes heightened demands on players' communication skills [45, 48, 49].

Despite the growing body of research on the impact of esports on students' competence development, several critical gaps remain in the current understanding of this phenomenon.

First, most studies focus on individual aspects of skill development without providing a comprehensive analysis of the impact of esports on students' leadership qualities, academic performance, and social skills.

Second, while research on traditional team sports provides compelling evidence of their positive influence on students' leadership development, the mechanisms of such influence in the context of team-based esports remain insufficiently explored.

Third, there is a need for empirical verification of the hypothesis that the skills acquired through esports activities can be effectively transferred to other areas of students' lives.

Thus, our study focuses on a comprehensive analysis that establishes the relationship between participation in esports and the development of leadership qualities, social skills, and academic performance and seeks to understand the underlying mechanisms of this influence. This determines the research question: "How does regular participation in team-based esports impact the development of leadership qualities, academic performance, and social skills among university students?"

Materials and Methods

The study was based on a quasi-experimental approach with repeated measurements and a comparative analysis of two participant groups. This design was chosen to minimize systematic selection bias in forming the experimental and control groups; enable the analysis of leadership development and social skills acquisition in the context of esports activities; integrate quantitative metrics and qualitative data for a comprehensive assessment of the program's effectiveness; maintain the natural conditions of the educational process during the experiment [50-55].

100 university students (n=100) participated in the study, divided into two equal groups of 50 each. Both groups were matched based on key characteristics such as age, gender, year of study, and baseline physical fitness level. The sample size was determined through a preliminary statistical power analysis to detect medium-sized effects ($d = 0.5$) with $\alpha = 0.05$ and a power level of 0.85. Inclusion criteria for participants were age between

18 and 23 years; full-time university enrollment; no prior professional experience in esports; continuous access to the necessary equipment.

In the framework of this study, team-based esports was conceptualized as a competitive activity conducted in a virtual environment through coordinated team interaction. The training program included core components, mandatory for all participants as per the university curriculum, and additional elements introduced specifically for the experimental group. A detailed structure of the program is presented in **Table 1**.

Table 1. Structure of the training program for the study participants

Program component	Experimental group	Control group
General developmental exercises	4 hours per week (according to the curriculum)	4 hours per week (according to the curriculum)
Basic physical training	Mandatory fulfillment according to the curriculum	Mandatory fulfillment according to the curriculum
Sports and mass activities	Participation according to the university calendar plan	Participation according to the university calendar plan
Team esports training	4 hours per week (2 sessions of 2 hours)	N/A
Total weekly workload	8 hours	4 hours

The students in the experimental group were assigned to teams based on their prior experience in Counter-Strike 2 and Dota 2. Particular attention was given to rotating leadership positions within the teams and practicing strategic decision-making under time constraints.

The control group, in addition to mandatory physical education classes, had the opportunity to play computer games as a hobby but did not participate in organized esports activities. This research design allowed us to isolate the effect of esports participation as the only independent variable influencing the development of the studied qualities.

The study was conducted over 16 weeks and consisted of three consecutive stages:

1. Preparatory stage (2 weeks): This phase involved initial participant testing, obtaining informed consent, forming teams, conducting preliminary interviews, and providing instructions on research procedures.
2. Main stage (12 weeks): This phase included regular training sessions, participation in internal competitions, analysis of gameplay sessions, and interim assessments every 4 weeks, with continuous monitoring of team interaction metrics.
3. Final stage (2 weeks): This phase involved final testing, concluding interviews, collecting objective performance indicators, and analyzing the studied qualities.

The research methodology included a set of validated assessment tools:

1. The Multifactor Leadership Questionnaire (MLQ Form 5X-Short) [56] is a standardized diagnostic instrument designed to evaluate various aspects of leadership behavior. The questionnaire consists of 10 questions rated on the 5-point Likert scale and measures three key aspects: transformational, transactional, and developmental leadership. Psychometric properties indicate high internal consistency (Cronbach's α ranging from 0.82 to 0.89). The construct and criterion validity of the questionnaire were confirmed in a student sample ($n=2,480$). The instrument was adapted for the Russian-speaking participants and standardized on a student sample.
2. The Communication Skills Scale (CSS) [57] is a comprehensive instrument for assessing interpersonal communication effectiveness. The scale consists of 16 statements rated on the 5-point Likert scale and covers four key aspects of communicative competence: verbal communication, active listening, nonverbal communication, and conflict management. The psychometric reliability of this method is supported by high internal consistency (Cronbach's $\alpha = 0.86$) and strong test-retest reliability ($r=0.84$ over a 4-week interval). The instrument underwent cross-cultural adaptation and validation for use in the Russian-speaking audience.
3. The semi-structured interview protocol is developed for the qualitative assessment of leadership development and team interaction in the context of esports activities. The interview includes five main thematic blocks: leadership experience, team interaction, skill development, conflict situations, and skill transferability. The validity of the protocol was confirmed through expert evaluation involving seven specialists in sports psychology and organizational leadership. The instrument's reliability is supported by a high level of inter-expert agreement ($\kappa = 0.88$). The protocol includes a system of clarifying questions and standardized criteria for assessing respondents' answers.

4. The academic performance assessment system is based on an analysis of the Grade Point Average (GPA) using a differentiated scale from 2 to 5 points. The system accounts for interim assessment results in core disciplines, applying weighted coefficients based on the workload of each course in credit units. The assessment methodology is integrated into the university's standardized academic evaluation system, ensuring an objective measurement of academic achievements within the formal curriculum.

The applied methodologies underwent the necessary psychometric validation and adaptation for use in the context of studying the student population, ensuring the reliability and validity of the collected data.

For data analysis, nonparametric statistical methods were used. Independent group comparisons were conducted using the Mann-Whitney U test, while the analysis of indicator dynamics was performed using the Wilcoxon signed-rank test. The relationships between variables were assessed using Spearman's rank correlation coefficient. The level of statistical significance was set at $p < 0.05$. The interpretation of correlation strength followed Chaddock's scale [58], where values of $|\rho| < 0.1$ were considered as no correlation, while $0.9 \leq |\rho| \leq 1.0$ indicated a high correlation.

Statistical data processing was carried out using SPSS 26.0. Qualitative analysis of interview data was performed using thematic analysis, employing a double-coding technique to ensure the reliability of interpretations.

Results and Discussion

The obtained data showed statistically significant differences between the experimental and control groups across key parameters. To assess the dynamics of leadership quality development, a comparative analysis of MLQ scores was conducted using the Wilcoxon signed-rank test for paired samples and the Mann-Whitney U test for intergroup comparisons (Table 1).

Table 2. Comparative analysis of leadership qualities by MLQ

MLQ indicator	Group	Beginning of the study Me (Q1; Q3)	End of the study Me (Q1; Q3)	U/W	p-value
Transformational leadership	Experimental	2.85 (2.52; 3.18)	3.54 (3.28; 3.82)	W=38.5	<0.001
	Control	2.80 (2.48; 3.12)	2.92 (2.62; 3.22)	W=425.5	0.245
Transactional leadership	Experimental	2.90 (2.64; 3.16)	3.45 (3.18; 3.72)	W=42.0	<0.001
	Control	2.88 (2.58; 3.18)	2.95 (2.68; 3.22)	W=412.0	0.384
Developmental leadership	Experimental	2.75 (2.42; 3.08)	3.48 (3.22; 3.74)	W=35.5	<0.001
	Control	2.72 (2.40; 3.04)	2.85 (2.54; 3.16)	W=398.5	0.289

Note: Me is the median, Q1 is the first quartile, Q3 is the third quartile, U is the Mann-Whitney criterion value, W is the Wilcoxon criterion value.

The data analysis showed that the experimental group demonstrated a statistically significant improvement across all components of leadership qualities ($p < 0.001$), with the best dynamics observed in the indicators of developmental leadership. No significant changes were identified in the control group.

To assess the dynamics of communication skills, we analyzed the results of the CSS using the Friedman test for multiple comparisons of related samples (Table 2).

Table 3. Dynamics of communication skills development

Component	Group	Baseline Me (Q1; Q3)	8 weeks Me (Q1; Q3)	16 weeks Me (Q1; Q3)	χ^2	p-value
Verbal communication	Experimental	3.40 (3.10; 3.70)	3.90 (3.60; 4.20)	4.25 (3.95; 4.55)	24.8	<0.001
	Control	3.35 (3.05; 3.65)	3.45 (3.15; 3.75)	3.50 (3.20; 3.80)	2.4	0.276
Active listening	Experimental	3.30 (2.95; 3.65)	3.95 (3.65; 4.25)	4.30 (4.00; 4.60)	28.6	<0.001
	Control	3.30 (2.95; 3.65)	3.40 (3.05; 3.75)	3.45 (3.10; 3.80)	2.1	0.312
Nonverbal communication	Experimental	3.15 (2.80; 3.50)	3.70 (3.40; 4.00)	4.00 (3.70; 4.30)	22.4	<0.001
	Control	3.20 (2.85; 3.55)	3.30 (2.95; 3.65)	3.35 (3.00; 3.70)	2.6	0.245

Note: Me is the median, Q1 is the first quartile, Q3 is the third quartile, χ^2 is the Friedman criterion.

The results demonstrate a significant improvement in communication skills in the experimental group across all assessed components ($p < 0.001$). The most visible dynamics were observed in the indicators of active listening ($\chi^2 = 28.6$).

To analyze the impact of esports activities on academic performance, we compared academic performance indicators using the Wilcoxon test (**Table 3**).

Table 4. Dynamics of academic performance of the study participants

Indicator	Group	Before the research Me (Q1; Q3)	After the research Me (Q1; Q3)	W	p-value
GPA	Experimental	4.10 (3.85; 4.35)	4.30 (4.05; 4.55)	108.5	0.042
	Control	4.15 (3.90; 4.40)	4.20 (3.95; 4.45)	386.0	0.684
Attendance (%)	Experimental	84.5 (79.5; 89.5)	89.0 (84.0; 94.0)	112.0	0.038
	Control	85.0 (80.0; 90.0)	86.0 (81.0; 91.0)	392.5	0.742

Note: Me is the median, Q1 is the first quartile, Q3 is the third quartile, W is the Wilcoxon criterion value.

The analysis of interview results from the experimental group identified key patterns in the development of leadership qualities (**Table 4**). Coding was conducted by two independent

researchers, followed by the calculation of Cohen's kappa coefficient to assess inter-rater reliability.

Table 5. Thematic analysis of the interviews of the participants from the experimental group

Thematic category	Frequency (n=30)	κ	Typical quotes
Strategic thinking	26	0.82	"I learned to analyze a situation holistically."
Emotional intelligence	25	0.85	"I became better at recognizing the emotions of the team."
Decision making	27	0.88	"I increased decision-making speed."
Teamwork	28	0.91	"I improved my understanding of team dynamics."
Conflict management	24	0.84	"I developed conflict prevention skills."

To assess the relationships between the studied variables, a correlation analysis was conducted using Spearman's rank correlation coefficient (**Table 5**).

Table 6. Correlation matrix of research indicators (experimental group)

Indicator	1	2	3	4	5
1. Transformational leadership	1.00				
2. Communication skills	0.68**	1.00			
3. Conflict management	0.64**	0.71**	1.00		
4. Academic performance	0.42*	0.38*	0.40*	1.00	
5. Team performance	0.58**	0.62**	0.65**	0.35*	1.00

Note: * $p < 0.05$, ** $p < 0.01$. The Spearman correlation coefficients (ρ) are presented.

The results demonstrate significant positive correlations between leadership qualities, communication skills, and team

performance. Moderate positive correlations were also found between academic achievement and other studied parameters.

These findings provide a foundation for further discussion on the mechanisms through which esports activities influence the development of leadership qualities and social skills among university students.

The results require a comprehensive reflection in the context of ongoing discussions about the role of esports in education. We do not expect this discussion to subside in the near future as more time spent in digital environments is associated with significant changes in the social interaction patterns of young people [59-61].

Thus, the academic community continues to engage in active debates regarding the status of esports as a legitimate sports discipline. Several scholars emphasize the fundamental differences between traditional sports and esports, particularly in terms of physical activity [44, 45]. However, our conclusions, along with studies by Almazov *et al.* (2022) and Zhong *et al.* (2022) [43, 62], indicate that when structured properly esports can serve as an effective tool for developing leadership qualities and social skills, i.e., traits traditionally associated with team sports [63].

The effectiveness of esports in developing leadership qualities is largely determined by a comprehensive approach to training. This integrated approach helped minimize the negative effects of prolonged computer use and contributed to fostering a healthy lifestyle.

The results obtained demonstrate statistically significant improvements in transformational ($p < 0.001$) and developmental leadership ($p < 0.001$) within the experimental group, aligning with the conclusions of Reitman *et al.* (2020) on the potential of esports in leadership development [24]. However, our data extend existing knowledge by demonstrating that esports can serve as an effective platform for cultivating leadership qualities in modern educational settings [64-69].

The analysis of quantitative data highlights the multifaceted impact of team-based esports on academic performance. The increase in GPA (from $M = 4.10$ to $M = 4.30$, $p = 0.042$) can be attributed to the development of strategic planning skills ($\kappa = 0.82$), the ability to make quick decisions in conditions of uncertainty ($\kappa = 0.88$), and improved concentration ($\rho = 0.58$, $p < 0.01$). These findings align with the conclusions of Qian *et al.* (2020) [25] which emphasize the positive influence of structured esports activities on cognitive functions relevant to academic success.

A quantitative analysis of social skill development showed statistically significant improvements across all components of communicative competence, including verbal communication ($\chi^2 = 24.8$, $p < 0.001$), active listening ($\chi^2 = 28.6$, $p < 0.001$), and nonverbal communication ($\chi^2 = 22.4$, $p < 0.001$). The biggest progress was observed in active listening, which correlates with enhanced team interaction efficiency ($\rho = 0.71$, $p < 0.01$). A qualitative analysis of interviews further supports the development of conflict management skills ($\kappa = 0.84$) and emotional intelligence ($\kappa = 0.85$), expanding upon the findings of Freeman and Wohn (2018) [44] and van den Berg and de

Villiers (2021) regarding the potential of virtual environments for social competence development [70].

A fundamentally important aspect is that the modern generation of students demonstrates high engagement with digital interaction formats [19, 71]. In this context, esports provides a unique opportunity to integrate digital technologies into the educational process to develop essential competences. As our study shows, esports activities that include mandatory physical training can address complex educational challenges beyond the traditional physical education model, focused on meeting standardized fitness requirements.

Conclusion

Esports should not be viewed as a replacement for traditional physical education. It serves as an additional tool that aligns with the interests of modern students and contributes to the development of in-demand professional competences. Combining esports training with mandatory physical exercises helps minimize potential risks (e.g., hypodynamia) and creates a balanced environment for comprehensive personal development. The interpretation of the results must consider several methodological limitations. The relatively small sample size ($n=100$) and the localized nature of the study hinder the generalization of its findings to broader student populations. A significant methodological constraint is that the study did not account for potential variability among teams in the experimental group, including differences in group dynamics, role distribution, and intrateam interaction styles. These factors may have influenced the development of leadership qualities and social skills, highlighting the need for a more detailed analysis of team mechanisms in future research. The study also did not include a direct comparison with a group of students engaged in traditional team sports, which presents an opportunity for further comparative studies. Despite these limitations, the empirical data obtained substantiate the feasibility of integrating structured esports programs into the educational process of higher education institutions as an effective tool for developing leadership qualities and social skills.

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