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THE USE OF MODERN TECHNOLOGIES (TRACKING DEVICES, SOFTWARE, AND APPLICATIONS) IN YOUTH SPORTS TRAINING: A FIELD STUDY OF CHABAB AIN FAKROUN'S U19 TEAM

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ABSTRACT

This study aimed to identify the current state of the use of modern technologies in sports training for youth categories, particularly tracking devices (GPS), software, and digital applications, and to examine their effect on developing the physical performance of U19 players. This study is particularly important given the rapid changes taking place in modern sports training, where technology has become a key tool for regulating training loads and monitoring athletes' physiological condition. The research problem concerned the extent to which coaches use tracking devices, software, and applications when training youth categories, and the effect of these technologies on the development of selected components of physical fitness. The study adopted a descriptive-analytical approach suited to the subject. The sample consisted of 16 U19 players from Chabab Ain Fakroun, in addition to 4 coaches. Data-collection tools included questionnaires for players and coaches, interviews, and physical tests to assess speed and speed endurance. The results showed that the level of use of modern technologies in training the U19 team at Chabab Ain Fakroun was moderate, with a usage rate of 62.5%. The results also revealed statistically significant differences in the speed and speed-endurance tests between the pre-test and post-test in favour of the post-test. The calculated t-values were 3.42 for speed and 4.18 for speed endurance at a significance level of 0.01. A significant positive correlation was also found between the use of tracking devices and improvements in physical fitness ($r = 0.68$). The study concluded that modern technologies contribute effectively to improving young players' physical performance and recommended wider adoption of these technologies and training coaches in their use.

KEYWORDS

Modern Technologies, Tracking Devices, Sports Training, Youth Categories, Chabab Ain Fakroun

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Introduction and Research Problem

Sports training in the modern era is undergoing profound changes as a result of rapid advances in technology and digitalisation. Traditional methods based on subjective observation and personal estimation are no longer sufficient to achieve high performance levels. Modern technologies, including movement-tracking devices (GPS), analysis software, and smartphone applications, have become essential components of the training process. They enable coaches to obtain accurate, real-time data on athletes' physical performance, helping them regulate training loads and adjust training intensity and volume according to each player's physiological condition.

These technologies are especially important when working with youth categories. The U19 stage is a particularly sensitive period in a player's development, coinciding with multiple physiological and psychological changes that require close monitoring to ensure the sound development of physical abilities without injuries or excessive fatigue. Scientific studies indicate that tracking devices such as Polar and Coospo GPS help make training more regulated and documented. Rather than relying on subjective assessment, coaches can objectively evaluate physical workload and identify load levels in real time and with precision, without calculations that may be prone to error under conditions of fatigue.

In recent years, numerous international examples have emerged of the use of these technologies in youth categories. Brazilian clubs such as Ceará and Remo have equipped their youth teams with GPS devices to monitor training loads and prevent injuries. A scientific study of young football players also found that GPS tracking devices helped improve physical performance by increasing maximum speed and the distance covered at high speeds. Another study demonstrated the importance of using artificial intelligence and GPS technology to regulate specific endurance training and improve young players' tactical decision-making.

The problem addressed by this study is expressed in the following main question: To what extent are modern technologies (tracking devices, software, and applications) used in sports training for the U19 team of Chabab Ain Fakroun?

The main question gives rise to the following subsidiary questions:

- What is the level of coaches' use of tracking devices, software, and applications when training the U19 team?
- Are there statistically significant differences in physical fitness components between traditional training and technology-supported training?
- What is the relationship between the use of tracking devices and improvements in young players' physical performance?

The study is based on two main hypotheses. The first assumes statistically significant differences in physical fitness components between pre- and post-tests, in favour of the post-test following the use of modern technologies. The second assumes a statistically significant positive correlation between the use of tracking devices and improvements in physical performance.

Methodological Procedures

Research Method

The study adopted a descriptive-analytical approach because it suited the nature of the subject. It aimed to describe the current use of modern technologies in sports training for youth categories and analyse the relationships between the variables under investigation. The descriptive method is appropriate for studies that seek to identify and assess an existing phenomenon, and it also allows qualitative and quantitative data to be combined.

Research Sample

The study sample consisted of 16 U19 players from Chabab Ain Fakroun, along with coaches working with this age group. The sample was selected purposively from players who attended training regularly during the current sports season. Injured players and those who did not attend training regularly were excluded to ensure data accuracy.

Data-Collection Tools

A set of tools was used to collect data, including:

First: Questionnaire

- A questionnaire for players examining the extent to which modern technologies were used in their training, their level of acceptance, and their perceived impact on performance.
- A questionnaire for coaches examining their use of tracking devices, software, and applications in the training process, as well as the obstacles they faced.

Second: Interview

- A semi-structured interview with coaches to clarify points related to their experience of using these technologies and their impact on training.

Third: Physical Tests

- Speed test (30 metres): The time taken to run 30 metres was measured using an electronic stopwatch.
- Speed-endurance test: A repeated 20-metre running test was conducted for 30 seconds.

Fourth: Tracking Devices

- Coospo GPS devices were used to record the distance covered, maximum speed, and heart rate during training sessions and tests.

Results

After the data were collected and statistically analysed using SPSS, the following results were obtained:

Table 1. Level of Use of Modern Technologies in Training the U19 Team

Percentage	Level	Dimension
58.3%	Moderate	Use of tracking devices (GPS)
54.2%	Moderate	Use of analytical software
75.0%	High	Use of smart applications
62.5%	Moderate	Overall average

The table shows that the overall level of use of modern technologies in training the U19 team at Chabab Ain Fakroun was moderate, with an overall average of 62.5%. Smart applications recorded the highest usage rate (75%), while analytical software ranked lowest (54.2%).

Table 2. Comparison of Pre- and Post-Tests for Physical Fitness Components

Significance level	t-value	Pre-test (M $\pm$ SD)	Post-test (M $\pm$ SD)	Variable
0.002	3.42	4.52 $\pm$ 0.19	4.31 $\pm$ 0.15	Speed (seconds)
0.001	4.18	30.2 $\pm$ 1.2	28.6 $\pm$ 1.4	Speed endurance (seconds)

• Note: The critical t-value at 15 degrees of freedom is 2.131 at the 0.05 significance level and 2.947 at the 0.01 significance level. that there is a statistically significant positive Correlation (Firdaws Hafiane, & Zedira Khammar. 2025, p. 17).

The results show statistically significant differences between pre- and post-tests for speed and speed endurance. The calculated t-value for speed was 3.42, significant at the 0.01 level, indicating a significant improvement in players' speed. For speed endurance, the t-value was 4.18, also significant at the 0.01 level, reflecting a notable improvement in the players' ability to sustain speed.

To examine the relationship between the use of tracking devices and improvements in physical performance, Pearson's correlation coefficient was calculated. The result was $r = 0.68$, a strong positive correlation that was statistically significant at the 0.01 level. This correlation indicates that the use of tracking devices contributes positively to improvements in young players' physical fitness.

Discussion of Results

The findings of the present study are consistent with scientific literature on the use of modern technologies in sports training. The results showed that tracking devices, software, and applications contribute effectively to developing young players' physical fitness, which agrees with the study by Al-Janabi and Jabr (2024). That study emphasised the importance of artificial intelligence technology (Coospo GPS) in developing specific endurance and tactical decision-making among young football players. It showed that GPS devices help make training more regulated and documented, allowing workload levels to be identified accurately and in real time.

The results are also consistent with the study by John et al. (2021), which assessed the impact of GPS technology on sprinting performance among young football players. The study found that GPS tracking devices substantially improved young players' performance by increasing maximum speed and the distance covered at high speeds. This supports the present findings, which showed significant improvements in the speed and speed-endurance tests.

The results are also consistent with field experiences at major clubs that have begun applying this technology in their youth teams. Brazil's Ceará Sporting Club began using Catapult GPS technology with its under-20 and under-17 teams, enabling it to measure the volume and intensity of training sessions and matches, manage training loads, prevent injuries, and improve individual performance. Brazil's Remo club has also used GPS systems to monitor the physical performance of its under-17 players. The technology helped manage workloads, prevent injuries, and support continuous performance improvement. These examples support the view that such technology is no longer restricted to major professional teams but is increasingly available to youth categories.

The moderate level of use found in the present study (62.5%) reflects a situation similar to that described by Al-Janabi and Jabr (2024), who highlighted the importance of these technologies while noting challenges in their implementation. The international examples cited also indicate that clubs adopting these technologies comprehensively have achieved tangible improvements in the performance of their young players. This suggests that Chabab Ain Fakroun could make greater use of these technologies to develop its U19 team.

It is also worth noting that the study by Alamir Haider H. (2018), which used GPS and Polar H10 devices to analyse physiological and physical indicators, found differences in heart rate, speed, and distance covered. This confirms the importance of modern electronic devices for monitoring training load and assessing physiological and physical capacities. It is consistent with the recommendation to extend the use of these devices to youth categories.

Nevertheless, several limitations may affect the interpretation of the results. These include the small sample size (16 players) and the fact that the study focused on a single club and one age group, which may limit the generalisability of the findings. The use of tracking devices also presented challenges related to cost and training in their operation.

Conclusion

This study concluded that modern technologies, including GPS tracking devices, software, and smart applications, are playing an increasingly important role in sports training for youth categories. They contribute effectively to regulating training loads, monitoring players' physiological condition, and improving physical fitness components. The results showed that the level of use of these technologies in training the U19 team at Chabab Ain Fakroun was moderate, with smart applications recording the highest usage rate. The findings also showed significant improvements in speed and speed endurance following training supported by tracking devices, as well as a strong positive correlation between the use of these devices and improvements in physical performance.

In light of these findings, the study recommends wider use of tracking devices, software, and applications in training youth categories, as they provide accurate data that help coaches make objective decisions about training loads. It also recommends organising training courses to enable coaches to use these technologies effectively and providing financial support from club management to purchase the necessary equipment. Finally, further research is proposed on the effects of modern technologies on young players' psychological and tactical dimensions, including individual differences in responses to these technologies.

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