Social networks as a lever for active learning and development of cognitive and technical skills in long jump: a study among Tunisian middle school students

Ayed Adel[1], Azaiez Fairouz[2]
1.ISSEP. Higher intitute of sport and physical education of Kef University of Jendouba Tunisia
2. LR19JS01 « education, motricity, sport and health (EM2S) »

Abstract
The study was conducted on a sample of 112 students divided into two groups; the experimental group (n = 56; age = 15.46 ± 0.50; body mass = 63.03 ± 3.93; height = 166.09 ± 4.79) and the control group (n = 56, age = 15.55 ± 0.56; body mass = 63.87 ± 4.40; height = 165.8 ± 4.92). The experiment examined the integration of ICT in physical education during a cycle of eight sessions of long jump. The objective of the study was to measure the cognitive and motor variables of each group to test the effect of this integration on the students' skills.
The repeated measures ANOVA test is also used in this study to verify the null hypothesis; the pre-test and post-test means of the experimental group and the pre-test and post-test means of the control group are equal. The results showed a significant difference at the alpha level = 0.05 and df = 55, in favor of the post-test measures of the experimental group for the variables measured in the study.
In conclusion, digital collaboration provides an effective response to physical education teachers who today need to find a new form of motor learning, less intrusive and more intelligent, as Nadam (2022) says. The digital teaching strategy is based on the principle of sharing teaching content with the right student, at the right time, and in the right context.
Keywords: Digital learning; long jump; free sharing; technical performance, cognitive performance.

Introduction

The expansion of research in the realm of Information and Communication Technologies in Education (ICTE) has not been complemented by the establishment of a well-structured environment or the development of widely accepted explanatory theories, as noted by Abdelwahed in 2014. This field encompasses various communities, some of which maintain connections with both educators and decision-makers who are eager to legitimize their policies advocating for the integration of ICT into pedagogy, as pointed out by Kaddachi in 2017.

It is also essential to underscore that the available documentation only provides a superficial treatment of policies and strategies regarding the incorporation of ICT in Tunisian higher education, as indicated by Taziri and Akkari in 2019. The studies and scholarly publications gathered thus far have been restricted to a limited number of articles, which do not offer a comprehensive understanding of the dynamics involved in the integration of ICT into teaching.
Social media platforms, such as Facebook and Twitter, serve as virtual spaces where individuals can share and exchange information, as highlighted by Krijnen, Nixon, Ravenscroft, and Scarcelli in 2023. This mode of communication has evolved into a global phenomenon, with millions of people accessing these platforms via their smartphones, tablets, and personal computers to engage with friends and acquaintances, as observed by Cano in 2020. As an example of its widespread reach, in May 2013, Facebook reported a staggering 665 million active daily users, a fact documented by Mercier, Ouakrat, and Pignard-Cheynel in 2018. In this era of innovation, although Facebook and Twitter were originally conceived for "social" networking, they have evolved to become integral tools in the educational strategies of educators (Sakout Andaloussi, Capus, & Université Laval. Faculté des sciences et de, 2019). For instance, through the exchange of knowledge on Facebook, social media have been proposed by (Ben Hammouda, 2018) as a means to enhance individuals' understanding of health and promote their involvement in physical activities. The goals of physical and sports education encompass acquiring knowledge, honing the ability to seek information, and mastering new motor skills (Essafri, 2020). Social media platforms offer educators the means to diversify resources, enrich activities, and vary learning contexts, although they can at times impact the teaching and learning

processes (Impedovo, 2021). These objectives extend beyond technical aspects, as educators also aim to cultivate collaborative learning experiences and emphasize the potential benefits they offer. Additionally, they are keen on developing new didactic scenarios to foster cognitive progress in students. In the end, the objective is to encourage experimentation, which entails formulating hypotheses and carrying out subsequent testing, as already determined by the educators. Growing awareness of the significance of physical education within the cognitive development and adaptation to our increasingly complex technological society, along with the substantial evolution of cognitive theories (from Piaget to information processing), has given rise to a significant stream of research. This research aims to assess the impact of various intervention methods on cognitive performance and to formulate a comprehensive concept of motor learning (Fiévez, 2017).

The majority of this research has concentrated on technical and motor skill methodologies, initially designed for individuals facing motor function difficulties or delays, often confronting various forms of failure. However, it is crucial to recognize the paramount importance of optimizing cognitive function for all individuals. Therefore, there is a need to design a comprehensive school education approach that is both versatile and encompasses prevention as well as corrective measures (Veillette, Rouleau, & Université Laval). In this article, we outline the principles that, in our view, should serve as the foundation for a comprehensive physical education program that encompasses all aspects of a student's development. While these principles may not fundamentally differ from those governing motor development, their significance and practical application differ in the two contexts. From this perspective, our study aims to paint a portrait of an engaged learner and seeks to address a gap in data regarding the current state of ICT integration in Tunisian education. Indeed, the contemporary student is expected to be versatile, capable of performing tasks anywhere and at any time, fostering both collaboration and competition, and contributing to the continuous creation of knowledge.

Materials and methods

Framework of the study

We employed the experimental approach, selecting two groups: an experimental group and a control group, along with pre and post-measurements due to their suitability for addressing the research question. The sample comprised 112 students, evenly split into two groups, with 56 students in the experimental group and 56 students in the control group. In order to establish equivalence between the two groups in terms of age, height, body mass, and the pre-test measurements of the variables under investigation, we conducted a t-test for two independent groups, as indicated by the results in Table (1).

Table 1. Characteristics of the sample (age, height and body mass)

	Experimental group N=56	Control group N=56
Age (years)	15,46± 0.5	15,55 ± 0,56
Size (cm)	166,08 ± 4,79	165,8 ± 4,92
Body mass kg)	63,03 ± 3,93	63,87 ± 4,40

Our approach involves the training and enhancement of the cognitive abilities of athletes, including attention, perception, reasoning, decision-making, coordination, and reactivity, after integrating the use of Facebook in the teaching and learning process. We also aim to assess the fundamental principles of the jump, which encompass the run-up, take-off, and suspension. In this article, we will focus specifically on the run-up, a component of paramount importance (Aubert, 1993). Notably, it is the horizontal speed during the run-up that plays a crucial role in maximizing the trajectory's range. Historically, some of the most exceptional athletes in this discipline have been accomplished sprinters. For instance, Bob Beamon achieved an 8.90m jump and ran the 100m in 10 seconds, while Carl Lewis achieved an 8.91m jump and completed the 100m run in less than 10 seconds...

Next, we aim to assess cognition and cognitive performance, the training methodology of the future. Notably, studies conducted with NASA-sponsored pilots (Kozuba & Sładkowski, 2019) and research

in basketball have demonstrated the potential to enhance on-field sports performance by training the brain (Loriette et al., 2022).

Protocol and measures

The simple performance measurement or subjective assessment of the students' behaviour in the study is essential. Referring to the competency-based approach to assessments of teaching content (Martinand, 2003), although we are aware of the difficulty, we share the idea of (Jarnet, 2005) who suggests establishing a national reference system. Whether it was to assess the cognitive achievements of the long jump discipline or the observable and measurable technical performance, the evaluators of this Protocol overwhelmingly ensured that their measuring instruments were directly related to competence. Our analysis of the items suggests that the instruments only assess the technical and cognitive skills of the students in the study. We grouped two sets of items that are indices of the cognitive aspect (technical knowledge and long jump rules) and the technical aspect (attitude and pace of run-up), and calculated the average of each of the two sets of items (Aroui & Carnus, 2021).

Carnus and Aroui (2021) found that 26 Tunisian inspectors (33%) do not use grids. They cited the diversity of teachers and the non-exhaustiveness of grids as reasons for this. Some inspectors also added that they are experts and that they rely on their experience and "maquignon eye" instead of grids.

This finding is concerning, as it suggests that a significant number of Tunisian inspectors are not using a systematic and rigorous approach to assessing physical education students. Grids can help inspectors to be more objective and consistent in their assessments, and to ensure that they are assessing all of the relevant skills and knowledge.

In addition, the fact that some inspectors are relying on their experience and "maquignon eye" is problematic. This approach is subjective and prone to bias. It also means that inspectors may be missing important information about students' skills and knowledge.

It is important for all Tunisian inspectors to use grids to assess physical education students. This will help to ensure that all students are assessed fairly and accurately. Jorro (2006) believes that this conception of inspection gives the inspector the position of an expert who possesses knowledge or a judge, since they seek to adapt and adjust. Sénore (2000) situates this conception within the charismatic paradigm, which is the foundation of the act of inspection. According to this paradigm, the inspector is a controller who has room for arbitrariness. In France, a higher percentage of inspectors use evaluation grids to assess against a more or less implicit standard and in their quest for objectivity, than in Tunisia.

Statistical analysis

Based on the results of the article, we can identify two key areas of teaching competence: run-up technique competence and cognitive skills competence.

Run-up technique competence encompasses mastery of and understanding of pedagogical progression, as well as the ability to critically analyze and use information and communication technologies.

Cognitive skills competence entails mastery of rules, strategies, and the history of the learning discipline.

Content knowledge competence, on the other hand, refers to knowledge of the subject matter within the discipline and the level of mastery of that knowledge..

Résultats

Table 3; Analysis of Variance (ANOVA)

Variables	Source of variances	Sum of squares	Ddl	Square of means	F
Terminologies and background	Inter groups	1227,107	3	409,035	91,981*
	Intra-group	978,321	220	4,446	
	Total	2205,428	223		

Knowledge and regulations	Inter grous	1111,107	3	370,369	
	Intra-Group	971,75	220	4,417	83,849*
	Total	2082,857	223		
Relaxed attitude	Inter groups	0,120	3	0,040	
	Intragroup	983,089	220	4,468	
	Total	983,209	223		0,0089
Stride amplitude	Inter groups	1037,763	3	345,921	
	Intragroup	987,875	220	4,490	77,036*
	Total	2025,638	223		
Running pace	Inter groups	1045,053	3	348,351	
	Intragroup	985,5	220	4,479	
	Total	2030,553	223		77,764*

Significance level. (α = 0.05); ddl = 223

Table 3 shows that the means of the measured variables are significantly different for terminology and history (f = 91.98 > f critical = 2.64), knowledge and rules (f = 83.84 > f critical = 2.64), stride amplitude (f = 77.03 > f critical = 2.64), and running rhythm (f = 77.76 > f critical = 2.64). However, there is no significant difference for the relaxed attitude variable (f = 0.08 < f critical = 2.64).

Table 4: LSD post hoc test results

	Measurements		**Differences in averages**				**LSD**
		Means	Exp. Pre	Exp. Post	Control pre	Control post	
Terminology and background	Exp. Pre	8,3392	-	5.357*	0.089	0.054	
	Exp. Post	13,696		-	5.446*	5.411*	19.38
	Control pre	8,25			-	0.035	
	Control post	8,285				-	
Regulations and technology	Exp. Pre	8,303	-	5.125*	0.071	0.018	
	Exp. Post	13,428		-	5.196*	5.107*	18.62
	Control pre	8,232			-	0.089	
	Control post	8,321				-	
Stride amplitude	Exp. Pre	10,25	-	5,017*	0.089	0.053	
	Exp. Post	15,267		-	4.928*	4.964*	17.79
	Control pre	10,339			-	0.036	
	Control post	10,303				-	
Running pace	Exp. Pre	10,357	-	4.964*	0.036	0.037	
	Exp. Post	15,321		-	5*	5.001*	17
	Control pre	10,321			-	0.001	
	Control post	10,32				-	

Note : * *P*< 0.05.

Differences in m or of the post-test experimental group for all study variables.

Discussion

Discussion of hypothesis (1): The use of Facebook as a didactic medium appears to be effective in supporting technical learning of stride amplitude during a long jump cycle. Table 3 shows the results of the ANOVA test, which was conducted with 223 participants. The F-statistic was 77.03, which is greater than the critical F-value of 2.64 at a significance level of α = 0.05. This indicates that there is a significant difference between the means of the four study measures: pre-test stride amplitude of the experimental group (= 10.25), post-test stride amplitude of the experimental group (= 15.26), pre-test stride amplitude of the control group (= 10.30), and post-test stride amplitude of the control group (= 10.35). Multiple comparisons performed by the LSD post hoc test revealed that the experimental group's average stride amplitude improved significantly compared to the control group's average stride

amplitude, as well as compared to the experimental group's own pre-test stride amplitude. This suggests that the use of Facebook as a didactic medium is effective in improving students' technical skills.

Our results align with school policy guidelines that emphasize the importance of encouraging teachers to use digital tools with their students to prepare them for the future (Soulé, Perrin, & Marchant, 2022). This study aims to identify the motivations and resistances of physical education and sports (PES) teachers to integrating digital networks into their classrooms for the benefit of the teaching-learning process (Essafri, 2020Similarly to the results of Bouhedja, Hamida, and Djemai (2021), the use of Facebook as a didactic medium allows learners to identify and visualize the key elements of a sprint movement, examine them in slow motion, and analyze them from different angles at a specific moment (Kermarrec et al., 2020). This improves the quality of image observation and can lead to better execution. In all cases, it increases knowledge of movement, which can enable learners to adapt their motor learning in an individual or even autonomous way.

Discussion of Hypothesis 2: The use of Facebook as a didactic medium appears to be effective in supporting technical learning of the slack run-up during a long jump cycle. Table 3 shows the results of the ANOVA test (ddl = 223, $F = 0.08 < 2.64$, $\alpha = 0.05$). There was no significant difference between the means of the four study measures: pre-test relaxed attitude of the experimental group (= 10.17), post-test relaxed attitude of the experimental group (= 10.26), pre-test relaxed attitude of the control group (= 10.33), and post-test relaxed attitude of the control group (= 10.20). This result suggests that the average relaxed attitude of the students in the experimental group did not improve compared to the average relaxed attitude of the students in the control group.

One of the drawbacks of using technology in technical learning is that learners may become too dependent on it, which can reduce their ability to make decisions based on their own experiences (Solís Molero, 2023).

Discussion of hypothesis 3: The use of Facebook as a didactic tool appears to be effective in developing students' cognitive abilities in motor learning situations. This makes Facebook a valuable tool for implementing pedagogical differentiation (Benramdane & El Baki, 2021). However, for Facebook to truly have a positive impact, learning must be meaningful for the learner. This means that the teacher should entrust the student with the responsibility of learning the task and let the learning devolve to them (Diaoune et al., 2020).

In addition to motor skills, using technology in physical education lessons can also lead to other learning outcomes. For example, students can learn to use digital tools to manage images, count, memorize, analyze results, direct activities, and time themselves.

Another interesting learning outcome is the potential of technology to mediate collaboration. A large body of research suggests that technology can help students work together more effectively. For example, Mauron and Corcetto (2018) found that using technology can improve collaboration even in pairs that are prone to conflict.

This study investigated the impact of technology on cooperation and interaction within different pairs during a learning activity designed to improve high jump technique. The aim of the study was to assess the impact of technology on collaboration and interaction without considering improvements in technical performance.

Conclusion

Constant and rapid innovation and adaptation are essential features of modernity, and are constantly promoted (Conference on Information Technology: Globalization et al., 1991). Modern acceleration and various official and media discourses all agree on the need to adapt the world of education (Hénocque, 2014). The demands of this adaptation are complex: schools must simultaneously transform themselves, integrate social networks, and enter the era of modernity and innovation (Pinte, 2010).

The digitization of physical activity is a rapidly evolving phenomenon that has been observed in a variety of contexts and practice modalities (Soulé et al., 2022). This study draws on didactic literature to synthesize the knowledge that has been produced on this topic. By combining complementary disciplinary perspectives, the study aims to identify the key themes in physical education and sports teaching that are related to the digitization of physical activity, such as the proliferation of connected

devices, the socio-cultural context in which this diffusion is taking place, the hopes and expectations raised by these devices, their various effects, the diversity of their uses, and the strategies and communication deployed by producers of sensors and mobile apps for sport and physical activity. In addition to providing a current state of the art, the study also aims to identify research gaps and neglected areas of inquiry.

Study limitations

Our second source of data on the use of Facebook in the classroom is our key informant. Their figures show that there is a high level of interest in social networking, and that a very large number of teachers have tried using their smartphones in the classroom at least once. Our findings from multiple data collection methods suggest that Facebook use is widespread but mostly occasional. During the past four school years (2019-2022), the key informant has been the most active participant in Facebook PE teacher groups, regardless of device type.

Statement by the research committee

The research protocol was thoroughly reviewed and fully approved by LR19JS01 "education, motricity, sport, and health (EM2S).

Consent to participate: All parents of minor students completed a consent to participate form.

Data availability: Data from this study are freely available upon reasonable request to the corresponding author.

Acknowledgements: The authors express their sincere gratitude to the school heads, PE teachers, parents, and all students who participated in this study.

Conflict of interest: The authors have no conflicts of interest to declare.

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