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# The Use of Technological Media in the Educational-Learning Process and Its Impact on the Acquisition of Motor Skills Among Primary School Students – A Case Study of Fifth-Grade Students

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**Abstract:** This study aims to examine technological media and its impact on the acquisition of motor skills by highlighting different types of learning in general and cooperative learning in particular, as well as audiovisual learning. The study was conducted in several primary schools in the Médéa province. To achieve the objectives, we followed a descriptive and analytical approach suitable for the subject and the nature of the variables. The study was applied to a sample of 32 specialized physical education teachers, randomly selected. Questionnaires were distributed to these 32 teachers, while only 8 of them participated in interviews as a research tool. After statistical processing, the results were analyzed and interpreted in light of modern theories. The findings indicate that the use of technological media contributes to enhancing the acquisition of motor skills among primary school learners. Furthermore, cooperative learning through multimedia improves students' perceptual-motor abilities at this educational stage.

**Keywords:** Technological media, Educational-learning process, Motor skills.

Article info

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**1. Introduction and Study Problem:**

Technological education varies in pedagogy and teaching according to the diverse uses and applications of technology in daily life. It plays a crucial role in enhancing communication between schools and society to refine the knowledge and skills that learners must acquire during their academic journey, helping them to face scientific and technological challenges upon graduation. In recent years, there has been a growing emphasis on incorporating educational experiences at early stages, most of which have been linked to computers and their applications in both the teaching and learning processes (Mohamed Mahmoud Al-Hila, 2004, p. 26). Since learning is one of the fundamental pillars upon which societies build their future generations, educators must respond to this vast technological advancement by developing educational institutions to keep pace with the nature of this era and the transformations shaping its wealth. Education must leverage the latest innovations and technologies to enhance learning processes in general, as well as physical education and sports in particular, by optimizing activities and achieving educational goals (Jamal Ahmed Salama & Ahmed Saeed Al-Jumla, 2023, pp. 13-14). Therefore, the integration of educational technology in physical education and sports sciences remains a highly debated issue, yet it provides immense opportunities to improve learning styles, as it represents an individual's approach to acquiring and processing information based on existing knowledge and environmental influences. Educational technology is not merely about introducing modern devices, tools, and materials into classrooms to transmit knowledge to learners. Rather, it is a complex, integrated process encompassing individuals, methods, ideas, and organizational strategies used to analyze problems and develop solutions. There is an undeniable interconnection between technology and physical education, as educational technologies are widely employed to enact continuous modifications in students' behaviors, attitudes, and motivations toward learning in various motor activities. These technologies also contribute to the development of diverse pedagogical strategies aligned with socio-cultural changes.

Educational technology captures learners' attention and perception during the acquisition of motor skills, helping them develop desired behavioral, social, and ethical values. Watching various athletic performances through multimedia tools or other educational mediums significantly enriches the learning experience. Technological advancements have led to the integration of digital media into educational processes, profoundly influencing teaching and learning, particularly in motor skill education for young students. These digital tools include software applications, interactive boards, educational games, virtual and augmented reality technologies, and educational robots, all of which have become essential components of contemporary learning environments. Educational technology extends beyond electronic teaching devices it encompasses technological approaches to delivering instructional content and enhancing learner performance through visual aids such as diagrams, images, educational videos, and animated demonstrations. In this scientific context, Fatima Ahmed Al-Khuzaila (2015, p. 12) emphasized the necessity for teachers to adopt systematic approaches by designing lesson strategies that integrate teaching methods and educational tools while considering classroom setup and student groupings. This requires moving away from traditional instructional methods such as lecturing and verbal explanation. Educational technology, therefore, involves software applications, learning scenarios, and devices that teachers and students skillfully utilize within structured systems to transition learners from abstract experiences to tangible ones. This facilitates learning processes and fosters comprehensive, integrated development.

In light of the educational process, we find that motor learning is one of its branches, as it is the process of transmission of information from the teacher to the learner alongside changes in motor behavior. Learning plays a crucial role in shaping individual behavior, helping learners acquire various behavioral traits such as running, jumping, walking, thinking, and problem-solving through different strategies and methods that ensure their survival and continuity in life. Motor learning can be defined as the process

through which a learner acquires and masters a skill, thereby enhancing their ability to perform the learned movement. In other words, it refers to the acquisition of a movement or a combination of movements. The success of motor learning and skill acquisition depends on several factors, including the learner's readiness for the learning process, cognitive processes, learning levels, and emotional influences.

While the learning process itself is not visible, the outcomes of skill learning can be observed through improved performance. This process occurs within the body and mind, involving the nervous system, brain, memory, and mental retention of a specific technique known as the motor program (Nahida Abdul-Zaid Al-Dulaimi, 2016, pp. 31-32). Hypermedia and various digital media interact with each other to enhance motor skill acquisition through motor learning. Consequently, young learners are equipped with an educational model that includes diagrams, animated images, colors, sounds, and text managed by computers. This strategy is employed to transmit and present knowledge and information in a qualitative manner, allowing learners to benefit from sensory-motor inputs. For instance, educational videos enable learners to interact with content and retain information in memory based on their individual needs and cognitive abilities. Unlike conventional multimedia, which displays segmented clips in separate screens, hypermedia supports pedagogical and motor interactions that foster self-directed learning in motor education. This contrasts with virtual classroom learning, which utilizes advanced computer programs and operating systems that integrate discussions, images, presentations, and educational games. To illustrate the relationship between educational technology and physical education, researchers Wissam Salah Abdul-Hussein and Samer Youssef Mutai highlight that physical education aims to promote comprehensive and balanced development in four key areas: physical, psychological, social, and cognitive. Additionally, it seeks to modify learners' behavior to help them adapt to their environment. For physical education to achieve its noble objectives, it must rely on scientific methods, which are rooted in educational technology. In essence, physical education cannot attain holistic development across different learner competencies within the shortest time and at the lowest cost without the implementation and utilization of educational technology.

From this perspective, it can be said that the relationship between them is a positive one, as the use of educational technology in physical education facilitates faster learning and optimizes time and effort. Consequently, multimedia and other technological tools become essential for the success of this dynamic educational field and the achievement of its intended objectives (Wissam Salah Abdul-Hussein & Samer Youssef Mutai, 2014, p. 172). Multimedia plays a crucial role in visual and sensory reinforcement, presenting information through audio-visual formats, which makes it easier for learners to comprehend complex movements and motor skills during motor learning. Motor learning represents a series of variables that occur through acquired experiences, leading to behavioral modifications in learners. As a key branch of the general educational process, it involves changes in motor behavior and performance ability resulting from learning, training, repetition, and correction, which ultimately lead to skill mastery. Each motor performance has a distinct structure, differing from other motor executions. This structure possesses specific characteristics and order, allowing for clear distinctions between broad jumping, high jumping, walking, and running, as each activity has its own unique attributes. Through this theoretical framework of motor structure, a general classification of motor skills has emerged (Mohammed Anisi Al-Kaabi & Mohammed Hadi Aboud, 2022, p. 39). Regarding motor activity and behavior, researcher Saeed Ghani Noori describes it as a blend of physical processes guided by mental motor actions, meaning that the decision to perform a movement originates in the brain before being executed by the motor system. Therefore, cognitive processes function as sensory centers within the learner's brain, receiving information from the external environment through sensory perception, which is then processed and interpreted by the mind to determine the appropriate motor response. These cognitive operations interact with the surroundings, transforming knowledge and information from one form to another. Although not visibly detectable, they play a critical role in a learner’s life, significantly contributing to learning and education (Saeed Ghani Noori, 2019, p. 45). With technological advancements, educational technology has evolved significantly, incorporating various multimedia tools, communication formats, and theoretical foundations for learning materials and systems. In addition to different instructional methods, technological devices, tools, and materials used in the educational process represent tangible objects, but their effectiveness depends on their integration to achieve specific objectives with maximum efficiency. These include audio software, static slides, multimedia platforms, hypermedia, interactive videos, the internet, and other technological tools, all of which encourage interaction, engagement, and attention during motor learning. They also support discovery-based learning, replacing passive verbal instruction with active exploration.

When teachers use this technology to enhance the learning process, it requires planning the use of tools and media and selecting the most appropriate ones. Teachers guide and direct the behavior of primary school children as they acquire various motor skills. This causal relationship is intertwined and reflects the scientific research gap. It should be noted that this is a dialectic based on coordination and intellectual construction, which undoubtedly requires us to address the following fundamental question:

**2. General question**: How do technological media reflect on the educational learning process in terms of the acquisition of basic motor skills by primary school students?

**2.1. Sub-questions**:

- How do technological media contribute to enhancing the acquisition of motor skills among primary school students? • Does cooperative learning through multimedia help improve the perceptual-motor abilities of primary school students?

**3. General Hypothesis**: Technological media in the educational-learning process have an impact on the acquisition of fundamental motor skills among primary school students.

**3.1. Sub-hypotheses**:

- Technological media contribute to enhancing the acquisition of motor skills among primary school students.
- Cooperative learning through multimedia helps improve the perceptual-motor abilities of primary school students.

**4. Study Objectives**: Exploring the most significant technological media used in teaching physical education and sports and their contributions to improving the efficiency of the educational-learning process, including concept formation, increased learner attention, and perception of values. Highlighting various learning types in general and cooperative learning through multimedia specifically, and its role in enhancing the perceptual-motor abilities of primary school learners. Strengthening the acquisition of motor skills by employing diverse technological media in both teaching and learning processes. Understanding and reimagining education in physical education and sports through cooperative and continuous learning using technology and multimedia, aiming to overcome pedagogical and educational challenges. Developing learners' ability for logical thinking through motor practice and adopting educational technology strategies for problem solving.

5. **The significance of the study** : is reflected in the following aspects:

Improving sensory-motor perception through the use of multimedia such as videos, which provide a clear and pre-established visualization of the movements and skills to be performed, facilitating their understanding and proper application.

Enhancing learning based on pedagogical interactions and active participation by observing movement models, imitating them, and improving performance.

Integrating teaching methods and strategies through multimedia adapted to all learning styles in motor education, including auditory, visual, and kinesthetic learning.

Improving the quality of motor learning among primary school learners through the teacher's use of advanced technological media.

Providing an engaging environment that increases motivation, participation, and interaction to foster students' willingness to engage in motor activities.

Highlighting auditory, visual, and sensory media to support memory retention of learned motor programs, making it easier to retrieve them when needed for accurate and correct execution.

Strengthening interactive and cooperative teaching methods using various educational technology approaches to enhance the overall quality of the educational-learning process.

**6. Defining terms and concepts**:

**6.1 Educational technology**: Conventionally, it is a systematic approach guided by organized knowledge, utilizing all available resources, whether material or non-material, in an efficient manner to achieve desired work outcomes with a high degree of precision and effectiveness (Jamal Ahmed Salama & Ahmed Al-Saeed Al-Jumla, 2023, p. 12).

**6.2 Technological media**: The term "media" is the plural of "medium," which has multiple meanings and refers to anything that can transmit information. "Multimedia" signifies the use of more than one medium, encompassing a set of two or more media employed to convey information in various forms and formats (Ghalib Muati Al-Farijat, 2014, p. 147).

**6.3 Multimedia**: The Arab Organization for Education defines multimedia as the integration of various means when presenting teaching materials, including printed materials, videos, slides, audio recordings, computers, and more.

According to Al-Dhobian, it comprises various communication methods that interact differently, store and transmit information, as well as facilitate recall through audiovisual tools, granting learners a degree of freedom in engaging with educational materials (Mohammed Mahmoud Al-Hila & Tawfiq Ahmed Marai, 2004, p. 19).

**Technological media procedurally**: These are the digital tools and techniques used for transmitting, storing, and displaying information in various ways and formats, such as audio, text, videos, illustrations, projectors, computers, mobile phones, the internet, in addition to various applications and software.

**6.4 Educational-learning process**:

**Conventionally**, Smith and Millary define educational methodology as the study of the necessary conditions in pedagogical situations or problems presented to students, allowing them to demonstrate how they utilize or reject their conceptual models. It consists of sets of methods, techniques, and approaches, fundamentally concerned with planning and monitoring pedagogical situations.

John Dewey places great importance on the learning activity, considering educational methodology as a theory of learning rather than teaching (Tayeb Nayt Slimane, 2015, p. 96).

In this context, Abdullah Al-Hamdawi describes educational methodology as the pedagogical situations selected by the teacher to assess students' core, specialized, transitional, and final competencies (Abdullah Al-Hamdawi, 2023, p. 76).

**6.5. Motor skills**:

**Conventionally**: Qadous defines motor skills as an individual's ability to perform a motor task or set of motor tasks, while Hisham Al-Husseini defines them as muscular performance, purposeful action, speed, accuracy, training, and regular practice.

Hammad views it as the ability of a learned individual to achieve a result by performing a motor task with the utmost proficiency and with the least possible effort and time. (Youssef Lazim Kamash, 2017, p. 443.)

**Motor skills procedurally**: are a set of athletic performances characterized by effectiveness, agility, accuracy, and good mastery, which can be acquired through practice and constant repetition.

**7. Previous, similar, or related literature**:

**7.1. First study**, Shufi Hussein, 2024, entitled, "The impact of an educational program using modern technology on improving some basic skills among secondary school volleyball team players." The study aimed to:
To highlight the importance of modern technology in improving the basic skills of secondary school volleyball players.
To adapt the use of Kinovia software as visual feedback to improve basic volleyball skills in secondary school.

Tools used in the study: The researcher relied on the experimental method, using a group rotation design, and employed tests as data collection tools, such as the front dive test, the serving accuracy test, and the rolling test. This study was applied to a sample of 12 players active in the school team of Mohamed Yaken High School, who were selected according to a comprehensive survey method. The results of this study showed the following: The positive effect of using Kinovia software as visual feedback to improve some basic volleyball skills in the sports team.

**7.2. The second study**, 2017, by Brahim Kaddour and Ayad Mustafa, entitled "The effect of using some modern teaching methods on learning some basic volleyball skills for 14- and 12-year-old students," aimed to:

To determine the effect of using the reciprocal method on learning some basic motor skills in volleyball.

To determine the effect of using the inductive method on learning some basic motor skills in volleyball.

Tools used in the study: The researchers used an experimental approach and relied on some tests, personal interviews, and observation. This study included a sample of 45 students, who were selected randomly, but it yielded the following results: There are statistically significant differences between the three groups in the post-test in favor of the experimental group, which used the inductive method in learning some basic skills.

8. Research methodology and field procedures:

1.8. Scientific methodology used: Choosing the right scientific methodology for the phenomenon being studied is a key step in the research process, but it depends on the nature of the problem, the study goals, and the type of data available. Based on the nature of the topic, we went with the descriptive approach, which is defined as: Based on the careful observation and monitoring of a scientific phenomenon or event, either quantitatively or qualitatively, at a specific time or over several periods, with the aim of identifying the phenomenon or event in terms of its content and implications, in order to arrive at conclusions and generalizations that help to understand reality. (Rabhi Muftah Alian, Othman Ghoneim, 2002, p. 43). In this context, Fatima Awad Sabir adds that descriptive research is not limited to collecting, classifying, and tabulating data and facts, but also involves a great deal of scientific analysis and accurate interpretation of the results, followed by generalizations about the phenomenon under study. (Fatima Awad Saber, Mirqat al-Khafaja, 2002, p. 87).

2.8. Study variables: Based on the subject of this scientific study, its problem, and its hypotheses, it is clear to us that there are two main variables, one of which is independent and shows the cause, and the other is dependent and shows the result. The independent variable: Technology media in the teaching and learning process. Dependent variable: Basic motor skills.

**8.3. Study population**: (statistical population): This is the original group from which the sample is taken. This group may consist of schools, teams, students, residents, or any other units. (Mohamed Nasr El-Din Radwan, 2003, p. 14) Without accurately and clearly defining the original population, the study sample will not be representative of the population, which limits the possibility of generalizing the results.

(Mohamed Fathi Al-Kurdani, 2015, p. 89), our study population consists of 237 physical education and sports teachers distributed across primary schools in the state of Medea.

**8.4. The basic study sample and how it was selected**: To obtain information from the original study population, we cannot use a comprehensive census method. Therefore, we refer to units that represent the population, or what is known as a sample, which is defined as: a category representing the community or research audience; that is, all the elements of the phenomenon being studied by the researcher, or all the individuals, persons, or things that are the subject of the study. (Wahid Douidri, 2000, p. 305). Due to several scientific considerations, including the large size of the study community, represented by the number of primary schools, and in order to save effort and time, we adopted a simple random sample for the selection of the sample. This was done by drawing lots for these elementary schools, from which we extracted 32 teachers, all of whom specialize in teaching physical education and sports at the elementary level. Twenty-four of them were given questionnaires, while the remaining eight were interviewed, as the interviews were mainly aimed at obtaining information, data, and opinions necessary and important for answering the study questions or solving the problem at hand.

**Table No. 01 shows the distribution of the sample of teachers according to the administrative educational districts of the state.**

| No. | Administrative educational districts | Primary schools | Number of sample members | Total |
|---|---|---|---|---|
| **01** | Beni Slimane District | 12 | 05 | 32 teachers |
| **02** | Ain Boucif District | 12 | 05 | |
| **03** | Chellalat El Adhaoura District | 12 | 05 | |
| **04** | Seghouane District | 12 | 05 | |
| **05** | Ksar El Boukhari District | 12 | 05 | |
| **06** | Berrouaghia District | 18 | 07 | |
| **Total** | 06 districts | 78 Primary Schools | 32 teachers in primary education | |

**8.5.1. Spatial boundaries**: We conducted the fieldwork for the study by distributing questionnaires to 24 specialized teachers working in primary education. These primary schools are distributed across some of the administrative educational districts of the province of Medea, as shown in the table above.
As for the procedures for applying the interview as a scientific research tool, the examinees, estimated at 8 teachers, were selected and provided with a suitable place in the educational institution, with sufficient time and complete comfort to answer the questions that had been prepared in advance. These questions are clear, accurate, objective, and sequential order. An interview recording device was used to ensure best practices were followed, such as impartiality, good listening, comfort and respect, with complete confidentiality, and finally a word of thanks to the participant.

**8.5.2. Time limits**: The study procedures were carried out in primary education during the period from the second half of January 2025 to March, and were devoted to constructing and designing the problem, setting hypotheses and objectives, reviewing previous literature, and establishing and fine-tuning the methodological procedures for the study. We then began the fieldwork to apply the research tools, namely the questionnaire and the interview, the latter coinciding with the middle of May of the same year.

**8.5.3. Human limitations**: In terms of people, the study focused on teachers who teach at the primary education level.

**9. Study tools**:

**9.1. Questionnaire**: The questionnaire is one of the most important and accurate scientific research tools for collecting information in physical education and sports sciences, especially descriptive and analytical research. It is a set of questions that the researcher asks the respondents according to his expectations for the subject of the scientific study. The answers are based on the researcher's expectations, which are formulated in precise and specific questions. This is not necessarily correct, because the correct answer comes from sources that cover the subject and live it, not from the expectations of a researcher who does not know the reality of the subject (Marwan Abdulmajeed Ibrahim, 2000, p. 165). It should be noted that the greatest effort in the questionnaire is focused on constructing its paragraphs in order to obtain complete, accurate, and reliable results. This can only be achieved in light of the clarity of the problem being studied and its hypotheses in terms of their nature and simplicity (Munther Abdul Hamid Al-Daman, 2015, p. 91).

**Table No. 1 shows the questionnaire questions as a scientific research tool directed at physical education and sports teachers in primary education**.

| | Numbering the statements | Interrogative statements | Always | Sometimes | Never |
|---|---|---|---|---|---|
| The study sample consisted of 24 teachers specialized in primary education who completed the questionnaire | 01 | The use of technology helps improve motor skill learning | | ✓ | |
| | 02 | Employing technology in learning improves response speed, balance, and motor adaptation | | | ✓ |
| | 03 | Explaining skills through technology helps you take individual differences into account when performing athletic movements | ✓ | | |
| | 04 | You face obstacles when using technology to achieve educational goals | | ✓ | |
| | 05 | Apps and software make learning motor skills easier than traditional learning methods | | | |
| | 06 | Technology applications provide you with the opportunity to create pedagogical interactions with learners during motor learning | | | |
| | 07 | Learners find it difficult to imitate movements that are displayed through technology media | | | |
| | 08 | The use of technology media such as video facilitates self-learning and repetition of motor skills for learners | | | |

**9.2. Interview**:

Interviews are considered one of the best methods of data collection in survey research, as they involve face-to-face interaction between the researcher and the respondent. However, they are not limited to verbal exchanges between the two, but also involve facial expressions, eye contact, gestures, and general behavior. (Fatima Awad Sabir, Marqit Khafaja, 2002, p. 131).

Scientific interviews enable researchers to establish relationships of trust and affection with respondents, which helps them to uncover the required information. Researchers can test the sincerity of respondents and the extent of their answers by asking other questions related to areas in which they have

doubts. (Mohamed Fathy Al-Kurdani, 2015, pp. 228, 227.) As a practical measure, we defined the objectives and identified the sample of respondents to be interviewed, namely eight physical education and sports teachers specializing in primary education. The questions were defined and the location of the interviews was determined. This was followed by the implementation and recording stage, using a voice recorder to obtain the answers, noting that this recording gives us more accuracy and objectivity.

**Table No. 2 shows the interview questions as a scientific research tool directed at physical education and sports teachers in primary education**.

| | Numbering the statements | Interrogative statements |
|---|---|---|
| The study sample consisted of 24 teachers specialized in primary education who completed the questionnaire | 01 | How does collaborative learning using multimedia stimulate learners to think kinesthetically and interact sensorially ? |
| | 02 | Do you think multimedia improves visual-kinesthetic perception? |
| | 03 | How do group activities using multimedia contribute to enhancing selective kinesthetic attention? |
| | 04 | How do you rely on immediate feedback during collaborative activities to enhance and strengthen motor memory? |
| | 05 | How does collaborative learning using technology enhance visual-motor coordination, balance, and motor intelligence skills? |
| Total | 05 Questions | |

**10. Statistical Methods**:

**10.1. Chi-Square Test for Statistical Significance (BRAVI PARSON)** : The Chi-Square ($\chi^2$) test is one of the most important non-parametric tests, primarily used for nominal and ordinal data meaning that the variables are categorized based on a nominal scale or specific classifications.

This test is applied to examine the relationship between two variables, determining whether they are independent or correlated. It is also used to assess whether the first variable influences the second. Additionally, it is utilized for data that follows a nominal level of measurement, typically presented in the form of frequencies.

**Df= (n –1 ) (S –1) =** !

$$Ki^2 = \sum \frac{(Fo-Fe)2}{Fe}.$$

Percentage Law:

**Table No. 03 displays the results of the questionnaire for physical education and sports science teachers at the primary education level**.

| | Repetitions / Paragraphs | Repetitions | | | | | |
|---|---|---|---|---|---|---|---|
| | | Always | Percentage | Sometimes | Percentage | Never | Percentage |
| Sample 24 Teacher | 01 | 14 | 33,58% | 06 | 25% | 04 | 16,16% |
| | 02 | 13 | 16,54% | 06 | 25% | 04 | 83,20% |
| | 03 | 12 | 50% | 07 | 16,29% | 05 | 83,20% |
| | 04 | 15 | 5,62% | 05 | 83,20% | 04 | 16,16% |
| | 05 | 14 | 33,58% | 07 | 16,29% | 03 | 2,12% |
| | 06 | 09 | 5,37% | 08 | 33,33% | 07 | 16,29% |
| | 07 | 12 | 50% | 10 | 66,41% | 02 | 33,8% |
| | 08 | 17 | 83,70% | 04 | 66,16% | 03 | 2,12% |
| | Total | // | // | // | // | // | // |
| | Calculated K 2 | 56,54 | | | | | $Ki^2 = \sum \frac{(Fo-Fe)2}{Fe}$ |
| | Scheduled K 2 | 23,68 | | | | | |
| | Freedom degree | **Df= (n -1 ) (S -1) = (3-1 ) (8-1) = 14** | | | | | |
| | Significance level | 0.05 | | | | | |
| | Statistical significance | Statistically significant | | | | | |

**Presentation of analysis and discussion of results in light of the first partial hypothesis**: Technology media contribute to enhancing the acquisition of motor skills among primary school students.

Based on the results obtained in the table above, after reading them in terms of percentage extraction and based on the number of repetitions for each question, we note that the majority of physical education and sports teachers answered "always"; that is, they use technological media because it helps improve learners' motor skills, in terms of watching educational videos or drawings that show them movements such as walking, jumping, throwing, and balancing, They learn by watching and imitating, but it also allows learners to repeat the skills several times, which enhances motor learning, at a rate of 58.33%. Meanwhile, a very small percentage of respondents answered "never," meaning that this technology does not help them, at a rate of 16.66%. This is in contrast to the teachers who answered "sometimes," with 25% saying that these media help in learning motor skills. As for the second statement, which shows that teachers always notice an improvement in response speed, balance, and motor adaptation, in terms of the use and application of these multimedia in the learning process due to their role in stimulating attention and mental processing speed, as well as integrating multiple senses.

These media integrate sound, image, and movement, which activates different sensory systems that work together to support motor performance and quick response with balance control. This is 54%, compared to 16% who answered "never," or 20.83%. Interaction with these media continuously activates communication between the brain and different parts of the body, enhancing sensory-motor integration, which increases the speed and transmission of neural commands during motor learning.

Motor learning is the acquisition, improvement, consolidation, and use of motor skills. It is a set of processes related to learning that take place within the body and mind, involving the nervous system, brain, and memory. However, multimedia such as images, videos, and simulations allow motor skills to be presented in different ways that suit various learning styles, including visual, auditory, and kinesthetic. In addition to its importance in taking into account individual differences among learners through a variety of presentation methods, interactions, and self-assessment, this is what most of the sample responded to in statement No. 03, with a percentage of 50%, as opposed to the rest who responded with "never," which was estimated at 20.83%. It is worth reading and analyzing that in the fourth paragraph of the question, five teachers answered "sometimes," meaning that we face some obstacles when using technology to achieve educational goals, at a rate of 20.83%. This is due to their lack of the necessary skills to use it effectively in design, coupled with the lack of computers, smart screens, or internet access in some schools, especially in rural areas with limited resources. Sometimes, we find that the unregulated or excessive use of media inevitably leads to distracting learners and causing them to lose focus on the educational goal. It is therefore clear that technology is not just advanced and modern devices, equipment, and tools, but rather a systematic way of thinking and an organized working method that includes all the elements on which the educational process is based, such as the curriculum, the learner, the teacher, and others. Its applications and software allow the correct model of movement to be viewed more than once, which supports self-learning and makes learning skills easier than traditional methods. This is what we observe in the responses of the sample group, estimated at 14 teachers, or 58.33%, contrary to the views of 3 teachers, or 12.2%.

At this point, we can consider that technology has significant benefits in the field of motor activity education. For instance, its advantages lie in restructuring and guiding teachers' thinking, enabling them to shape self-directed learners capable of creativity, innovation, free discussion, and logical thinking. This helps develop a productive personality based on structured reasoning. Thus, the use of audio-visual tools, which rely on sensory systems to provide stimuli for response, plays a supportive role in learning. These tools include various speaking display devices, animated image projectors with audio commentary, slides accompanied by recorded explanations, and multimedia electronic computers—all of which contribute to creating an interactive learning environment by integrating theoretical knowledge with practical application. Utilizing three-dimensional motion recordings assists learners in understanding and grasping motor learning stages, including angles and appropriate timing for skill execution. Additionally, collaborative learning applications foster pedagogical interactions between teachers and students, as well as among students themselves, enhancing motivation.

This is evident from the responses to the sixth survey question, where the majority of respondents answered "Always" (37.5%), contrasting with those who responded "Never" (7 respondents, 29.16%). Achieving motor skill application or determining performance characteristics that distinguish learners' movements is not easy for teachers, as skill definitions vary. Mechanically and physiologically, muscle groups in skilled performance contract and relax in coordination to serve motor tasks. Therefore, learners often struggle to imitate movements presented via multimedia, as indicated by two instructors who responded to the seventh survey question (8.33%), in contrast to their peers who answered "Sometimes" (41.66%). It becomes evident that a beginner learner may observe alignment in the functioning of their muscles involved in motor performance. This is because the contracting and extending muscles participating in the motor action operate in a non-coordinated or inconsistent manner, leading to instability and lack of balance when executing fundamental motor skills. Skill development occurs through continuous and structured learning, which improves perception and reaction time in young learners, refining their skills. Eventually, the learner transitions to self-regulated control, relying on feedback mechanisms. In this regard, multimedia tools such as videos play a crucial role in facilitating self-learning and acquiring motor movements through visual and auditory repetition. Repeated exposure

to educational videos enables learners to grasp skills with precision. Additionally, employing various strategies to enhance sensory-motor perception reinforces long-term memory retention of motor performances. By integrating multiple media sources, learners can compare their own movements to ideal model performances presented through technological resources, allowing them to identify discrepancies and correct mistakes autonomously. This aligns with survey responses, where the majority of instructors answered "Always" (70.83%), as opposed to those who responded "Never" (12.2%).

In light of this discussion, the mental storage theory aligns with this analysis, as it suggests that incoming information from the environment is stored through sensory inputs in the central nervous system. This information remains stored as coherent systems, which are later retrieved through stimuli as outputs. Here, the learner's cognitive domain and abilities play a crucial role in storing information obtained from the teacher's explanation and clarification. These inputs undergo learning or training, and correct execution leads to outputs, supported by feedback (Wissam Salah Abdul-Hussein & Samer Youssef Mutai, 2014, p. 32). This feedback mechanism is based on the closed-loop theory, where movements are executed by comparing feedback from the body's sensory receptors to the corrective reference learned previously. This corrective reference or feedback data autonomously determines error margins through sensory perception (Saeed Ghani Noori, 2019, p. 128). Upon analyzing the results and applying the Chi-square test ($\chi^2$), the calculated value ($\chi^2 = 54.56$) was found to be higher than the tabulated Chi-square value (23.68) at a significance level of 0.05 and a degree of freedom (Df = (n - 1) (S - 1) = (3 - 1) (8 - 1) = 14) across all survey items. Therefore, we can conclude that statistically significant differences exist among respondents, confirming the hypothesis that technological media effectively contribute to enhancing the acquisition of fundamental motor skills among primary school learners.

**12. Presentation, Analysis, and Discussion of the Second Sub-Hypothesis Results: Cooperative Learning Through Multimedia Contributes to Improving the Motor and Perceptual Abilities of Primary School Students**.

The research did not rely solely on the questionnaire, but also incorporated interviews as a technical tool to deepen the understanding of field data, assess its reliability, and broaden the scope of analysis for a more comprehensive approach. This allowed for the collection of essential information, data, and opinions required to answer the study questions or resolve the research problem. The interviews were conducted with a sample of respondents, specifically specialized teachers in physical education and sports at the primary education level. The discussions took place at the end of April 2025, based on pre-prepared questions. To ensure accuracy, an audio recorder was used as a technique for capturing responses. This group was selected based on the nature of the study, which focused on the use of technological media in the educational-learning process and its impact on the acquisition of motor skills among primary school students.

**Question (01): How does cooperative learning through multimedia stimulate learners' motor thinking and sensory interaction?**

The responses from five physical education and sports teachers were highly significant, as they affirmed that cooperative learning through multimedia enhances learners' motor thinking and sensory interaction during motor activity education. According to their perspectives, this occurs through the integration of multiple technologies, including educational videos, animations, interactive games, and motion simulations, which help motivate learners to engage in practical, applied, and sensory interactions. These processes follow an insight-based mechanism, allowing learners to imitate demonstrations through visual observation and attentiveness, leading to sensory-motor perception. This sensory-motor perception is interpreted through stimuli that impact independent nerve cells, which are specialized sensory cells typically influenced by specific energy changes. For example, auditory cells react to light waves, transmitting nerve impulses from independent cells to the brain, where these impulses are translated into responses, manifested as movements. The brain then reprograms these responses, leading to understanding, comprehension, and motor thinking. However, three teachers (03) expressed a less affirmative stance, indicating that cooperative learning through multimedia may, in certain situations, be

affected by technical challenges, such as system malfunctions or slow internet connectivity. These issues can negatively impact sensory interactions and cognitive engagement, hindering learners from mastering realistic movements. This underscores the critical role of the teacher in effectively utilizing and implementing these multimedia tools within the learning process.

**Question (02): Do you think multimedia improves visual-motor perception?**

Seven teachers responded that this is an important question, emphasizing the necessity of multimedia such as images, graphics, and interactive presentations, all of which play a significant role in improving visual perception by stimulating multiple senses. These tools integrate sight, hearing, and sometimes touch in interactive presentations, making learning more engaging while strengthening motor information retention, attention, and focus. According to their perspectives, animated visuals or illustrative images enhance learners' attention, helping them process sensory information and associate it with appropriate movements. This explains the integration of sound, image, and movement, which helps the brain construct a stronger sensory map, improving the speed and accuracy of perception and fostering visual-motor memory. On the other hand, one teacher expressed a different opinion, stating that multimedia may negatively affect visual-motor perception by distracting attention meaning that excessive visual and motor information could overwhelm the brain, making it harder for children to focus on the learning objective. As a result, learners may struggle with accurate perception of what they see and do.

Additionally, this teacher noted that over-reliance on interactive media, rather than real-world play, might slow the development of fine motor skills. Given these differing viewpoints, it is essential to employ various teaching strategies that accommodate different learning styles, ensuring that technology is used effectively while considering individual learners' abilities and personal differences.

**Question (03): How do group activities using multimedia enhance selective motor attention?**

Responses from teachers were fairly similar, with five teachers stating that group activities using multimedia contribute to attention development, particularly selective attention. They explained that multimedia-rich environments create visual and auditory stimuli, requiring participants to filter out distractions and focus on important information, which facilitates selective attention. Another teacher added that strengthening executive brain functions is based on visual and auditory input, which stimulates the brain regions responsible for attention and cognitive control. However, two teachers shared a different view, asserting that multimedia can sometimes generate excessive sensory overload through images, sounds, and effects, resulting in cognitive burden that hinders effective stimulus filtering. This idea aligns with Deutche's single-channel hypothesis, which suggests that individuals process only one stimulus at a time, meaning they cannot focus on two simultaneous stimuli. Kahneman later demonstrated that attention capacity varies depending on the complexity of stimuli and the required cognitive task. When two stimuli appear simultaneously, the brain must process them sequentially. However, if the stimuli exceed the person's cognitive capacity, interference occurs, leading to incorrect movements and responses (Yaareb Khayoun, 2015, pp. 72-73). Given the diverging opinions, it is necessary to evaluate whether multimedia usage is excessive or poorly managed—as in such cases, it may hinder selective attention rather than enhance it. Conversely, when applied thoughtfully and in alignment with appropriate teaching methods, moderated and purpose-driven multimedia use can effectively support selective motor attention.

**Question (04): How does immediate feedback during cooperative activities strengthen motor memory?**

Three teachers stated that learners can compare their actions and results, using sensory mechanisms to adjust and provide internal feedback for error correction while learning motor skills. Another teacher noted that learners who have not yet mastered new skills struggle to visualize movements precisely, emphasizing that repetition in different conditions improves focus, attention, and perception, helping solidify motor patterns. Additionally, four teachers highlighted that immediate feedback in cooperative activities acts as a continuous reference for correction, relying on motor nerve cells within muscle fibers to ensure ongoing adjustments and learning progress toward proficiency. This is achieved through

physical cues or verbal guidance, where the teacher actively points out mistakes during skill application. According to Nahida Abdul-Zaid Al-Dulaimi (2016, p. 103), immediate feedback provides learners with essential information regarding each response, offering guidance and instructions to strengthen, develop, and correct behavior.

**Question (05): How does cooperative learning with technology enhance visual-motor coordination, balance, and motor intelligence?**

Six teachers confirmed that cooperative learning supported by technological media plays a significant role in enhancing visual-motor coordination, balance, and motor intelligence by creating interactive visual environments that integrate sensory and motor systems within small-group learning contexts. Interactive visual tasks presented via multimedia require learners to track visual demonstrations and respond with precise movements, training executive brain functions to synchronize vision and motion in a procedural manner while strengthening neurological foundations of visual-motor integration. Through video simulations, learners activate their visual system dynamically, linking sensory inputs with movement stimulation, which creates shared neural circuits that reinforce visual-motor coordination. However, two teachers noted that cooperative learning affects intelligence by diversifying motor roles within small groups, where body language, gestures, movement guidance, and synchronization foster awareness and strengthen motor intelligence in practical applications. This approach also enhances balance, flexibility, and motor memory. From the perspective of cognitive learning theories, perception, motivation, and thinking are fundamental to motor skill acquisition, with reflexive processes playing a primary role in learning. Cognitive theorists argue that learning depth depends on the learner's ability to process and structure information, while constructivist theory suggests that learning occurs through observation, processing, interpretation, and contextual application, meaning that children learn best when engaged in real-world, hands-on activities that create meaning (Saeed Ghani Noori, 2019, pp. 26-27).

In light of this in-depth analysis and discussion of the hypothesis, based on interview questions and responses from the sample group, it is evident that technological media play a crucial role in developing learners' motor and cognitive abilities in motor activity education. Using learning technologies such as interactive programs images, graphics, animations, and educational videos enhances skills, cognitive abilities, comprehension, absorption, thinking, attention, and perception, including problem-solving and decision-making. This aligns with cybernetics and motor control theory, pioneered by Norbert Wiener, which emphasizes motor skill acquisition through structured models. According to the information construction model, brain information processing follows a hierarchical structure: New information enters through the top of the hierarchy, familiar skills move to a lower level, fully automated skills descend to the base of the structure. If a learner wishes to acquire a new skill, they must engage their full cognitive capacity, focusing on attention, concentration, memory retrieval, and response preparation. However, with skill repetition, cognitive effort gradually decreases until decision-making and execution become automatic. Regarding Wiener's motor control model, it suggests that movement requires planning, meaning that before performing a physical action, one must strategically coordinate muscle groups to achieve fluid motion. Once this coordination is established, the central nervous system executes the movement, which is perfected through continuous repetition and error correction. The more repetition and correction occur, the smoother and more coordinated the movement becomes (Mohammed Anisi Al-Kaabi & Ali Mohammed Hadi Aboud, 2022, pp. 67-75).

**General Conclusion**:

After conducting an in-depth study of the phenomenon, analyzing the data and variables, and clarifying the overlap and causal relationships, the research applied scientific methods, including questionnaires and structured interviews, along with statistical analysis techniques to interpret results and examine hypotheses. Based on the main research question: How do technological media in the educational-learning process influence the acquisition of fundamental motor skills among primary school students? The findings of this study reveal the following:

- The use of technological media enhances the acquisition of motor skills among primary school learners, thereby improving movement quality and performance efficiency.
- Visual and auditory presentations help clarify motor concepts, enabling learners to comprehend, perceive, and execute proper movements and technical steps more effectively than traditional theoretical explanations.
- Multimedia allows learners to repeatedly watch correct movement executions, reinforcing collaborative and self-directed learning while strengthening skill retention through study and review.
- Multimedia activates multiple senses, such as hearing, vision, and sometimes touch, facilitating motor comprehension and embedding knowledge into long-term memory.
- Multimedia supports individual learning differences, helping learners overcome challenges and achieve proficiency.
- Motivation is stimulated through optimized multimedia use, as motion images, educational videos, and visual graphics draw attention, enhance selective focus, and increase learners' engagement in motor learning activities.
- Cooperative learning with multimedia improves motor and cognitive abilities, fostering thinking, perception, and attention, while encouraging sensorimotor interaction. Integrating movement, sound, and visual stimuli strengthens coordination between sensory perception and motor response, a fundamental element of motor-cognitive skills.
- Multimedia plays a crucial role in reinforcing cooperative learning strategies, as demonstrated by the study results. Learners collaboratively solve problems and engage in activities, providing frequent opportunities for observation, imitation, and feedback, all of which contribute to motor skill development.

**Conclusion**:

Technology in the educational-learning process represents an interwoven and multifaceted system. It encompasses learners, methodologies, tools, and organizational frameworks that teachers employ to solve problems, construct solutions, implement them, and assess outcomes. Modern technology helps schoolchildren acquire various skills, fostering cognitive, emotional, and motor development. It serves as the primary component in designing educational environments, shaping learning experiences, and optimizing resources to achieve objectives efficiently, in minimal time, and with reduced effort. Consequently, multimedia has become a central tool in supporting educational processes, moving beyond traditional learning methods. Instead, education now relies on interactive digital environments that harness technology to enhance comprehension, develop skills, and facilitate self-directed learning. Despite the vast educational opportunities offered by multimedia tools such as instructional videos, 3D simulations, and real-time feedback there remain real challenges in effectively integrating technology into motor skills education. The primary concerns revolve around its compatibility with learners' psychomotor characteristics and its impact on cognitive and perceptual ability development.

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