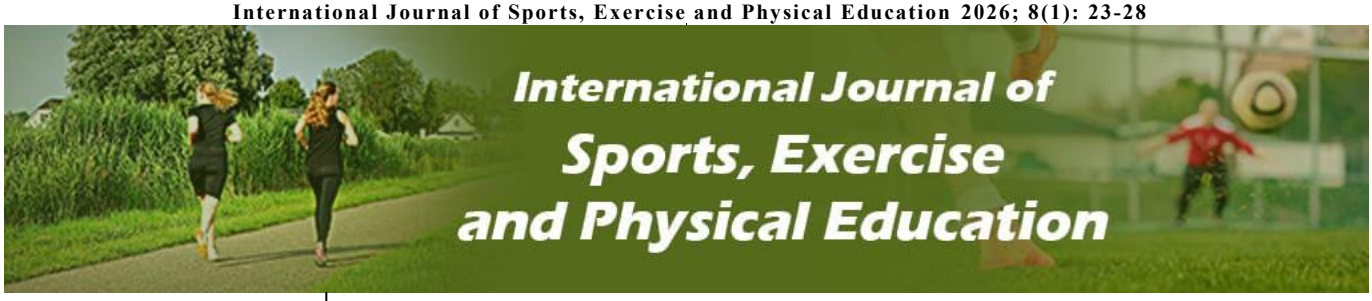

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Designing an electronic cognitive test in the wrestling game for the students of the faculty of physical education and sport sciences

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Abstract
The present study seeks to develop an electronic cognitive assessment for third-stage wrestling students at the Faculty of Physical Education and Sport Sciences, Misan University. The researchers employed an experimental approach, consisting of one experimental group and one control group, utilizing pre- and post-measurements. The study population comprised preschool students at the Faculty of Physical Education and Sport Sciences, Misan University. The research sample comprised 35 students from the overall population, selected through a deliberate method and divided into two groups: a control group of 15 students and an experimental group of 15 students, along with a survey sample of 5 students. Selection criteria included: no prior knowledge of wrestling skills, regular attendance, and possession of devices to access the educational platform. The researchers employed the computerized cognitive achievement test to evaluate the effect of the proposed program on students. The primary findings revealed statistically significant differences between the average scores of the two-dimensional assessments for the experimental and control groups, favoring the experimental group regarding the cognitive success of female wrestling students. A crucial recommendation is to focus on the advancement of electronic cognitive accomplishment assessments and to emphasize the integration of contemporary technological instruments in the educational process to enhance students' cognitive performance.

Keywords: Designing, electronic cognitive, wrestling game

Introduction
Mathematical knowledge is a vital requisite for an individual to acquire a set of accurate behaviors and essential mathematical skills (Liu & Ji, 2023) [5]. Enhancing the learner's comprehension of theoretical and practical knowledge in sports significantly contributes to the optimization of skill performance (Abrams, 2023) [1]. Furthermore, the augmentation of theoretical knowledge correlates with prolonged retention continuity in contrast to physical skills (Weiss, 2020) [14]. The more extensively the learner explores theoretical concepts, the greater the enhancement of their physical fitness, whether general or specific (Singh & Parmar, 2023) [11]. In their portrayal of Bucher's comment, Kalén *et al*. (2021) [3] underscore the significance of cognitive tests as among the most prevalent and precise assessment instruments. Siedentop, Hastie, and Van der Mars (2019) [10] assert that the test is not an end in itself, but an essential tool for assessing educational achievement and the acquisition of knowledge in individuals. Scharfen and Memmert (2019) [9], referencing Paroul *et al*., highlight the strong correlation between the cognitive and motor domains, identifying the initial phase of motor skill acquisition as the cognitive stage. Mitchell, Oslin, and Griffin (2020) [8] assert that cognitive assessments are frequently utilized in conjunction with skill evaluations to aid learners in comprehending the rules and principles inherent in various sports contexts. These assessments are crucial for attaining the objectives of educational programs across physical, psychological, cognitive, and social dimensions (Wang *et al*., 2024) [13]. In the broader context of education, Acquah-Sam (2021) [2] elucidates that as the demand for university education escalates, it has become imperative for industrialized nations to invest in digital technology to augment educational institutions. This method seeks to establish an interactive educational setting that fosters creative thinking and facilitates the interchange of ideas and experiences among students (Song, 2024) [12].

The Internet serves as an excellent medium for accomplishing this via remote education, utilizing technology resources like as virtual colleges, e-bags, and e-learning platforms (Kraja, 2023) [4]. From this perspective, the researchers created an electronic cognitive assessment utilizing the "Schoology" platform. Mazer (2020) [6] asserts that wrestling is differentiated from other sports by the fundamental abilities that must be mastered, including precise control of hand and foot movements, among other essential techniques. To elevate a player to the professional sporting echelon, it is imperative to learn the fundamental abilities and principles of the game, emphasizing their correct execution to attain harmony and precision under match pressure (Mirzaei, 2021) [7]. Researchers concur that these competencies constitute the foundation of all sports, including wrestling. Following specialized research in the field of wrestling, the investigators observed an absence of electronic cognitive assessments that evaluate the cognitive dimensions of this activity among pre-school pupils in physical education and sports sciences faculties. Assessing the cognitive abilities of this group is essential for comprehending their understanding of sport-related theoretical topics. Recognizing the significance of knowledge and assessment tools in monitoring students' academic progress and fulfilling educational objectives, researchers aimed to develop an electronic cognitive test for preschool students to evaluate their cognitive abilities in the sport of wrestling.

Research Objectives

The research aimed to develop an electronic cognitive test model to be applied in the hall environment for students at the pre-school stage at the Faculty of Physical Education and Sport Sciences, Misan University.

Research Questions

The electronic cognitive test that is being worked on as part of the research focuses on measuring the cognitive abilities related to the hall environment among students at the pre-school school at the Faculty of Physical Education and Sport Sciences, Misan University.

Methodology

Research Methodology

The researchers adopted the descriptive-analytical method, where they followed the survey method due to its suitability to the nature of this research. The study sample was also selected using the appropriate research method.

Research Sample

The random deliberate study of a group of third-stage students at the Faculty of Physical Education and Sport Sciences at Misan University was conducted during the first semester of the year 2024/2025. The number of students included in the study reached 35 students, and 5 of them were excluded from the survey sample. Thus, the number of members of the main sample that underwent the research reached 30 students, as they were selected according to the following conditions:

1. The student should not have any prior knowledge about the skills required within the field.
2. The student must be committed to attending regularly.
3. Parents of students should be sufficiently familiar with the use of e-learning platforms.

Sample homogeneity

The researchers conducted a comparative study among the members of the research group regarding the basic variables such as age, height, and weight at specific growth rates, according to a specific model to achieve the study objectives.

Table 1: Shows the statistical characterization of the variables (age, height, weight) of the sample under study

Variables	Unit of Measurement	Control		Experimental		Contrast	F
		M	SD	M	SD		
Age	Year	21.59	1.18	21.34	1.25	0.734	1.16
Weight	kg	66.22	4.88	68.19	5.06	15.48	1.06
Length	CM	169.84	7.31	170.11	6.99	24.65	1.25

The data for the comparison between the control and experimental groups indicate that there are no statistically significant differences in age, height, and weight variables. The calculated comprehension values ranged from 1.06 to 1.25, which is lower than the tabular value of 2.17, indicating that the characteristics between the two groups are similar in accordance with the study design and the required homogeneity criteria.

Tools and devices used in the study

- Computer.
- Data Display.
- Ball throwing device.
- 25 large balls.
- 25 small balls.
- 3 kg medical balls.
- Swedish Sport Seats.
- Tape measure.
- Stopwatch.
- Signage.
- Trainer's Ruler.
- Restameter to measure height in centimeters.
- Medical scale to measure weight in kilograms.

Cognitive Achievement Test in Wrestling

The researchers reviewed a number of scientific sources and previous studies that dealt with evaluation methods and objective testing. These reviews aim to learn how to build manual tests, and in order to achieve this goal, the researchers followed the following steps.

Determining the Objective of the Cognitive Achievement Test in Wrestling

Based on the basic skills listed in the course, the objective of the cognitive test was determined, which seeks to measure the level of cognitive achievement of the study sample. The test focuses on assessing the extent to which students in the third stage at the Faculty of Physical Education and Sport Sciences at Misan University have comprehended the study materials and concepts related to the basic skills in the field under study. This includes the knowledge and concepts contained in the proposed educational program. The adaptation of the test to the appropriate academic level for the stage was also taken into account. Study the research sample, to ensure the suitability of the content and evaluation objectives with the required scientific and practical capabilities.

Determining Criteria for the Electronic Cognitive Achievement Test in Wrestling

To identify the main themes of the cognitive test, the researchers reviewed the educational courses related to the field of physical education and sports sciences at the of Physical Education and Sport Sciences at Misan University. The approved scientific materials were also reviewed in the same hall with the aim of identifying the main topics that are focused on during teaching. In addition, the researchers prepared a special form to survey the opinions of experts in the fields of curriculum and teaching methods as well as in the field of physical education. Curriculum and teaching methods, and five experts in the field of physical education. The researchers made sure that the experts meet the following conditions:

1. They must be faculty members in the faculties of physical education and sports sciences, specialized in the field of curricula, teaching methods, and physical education.
2. Their experience should be at least five years.

These experts were used during the preparation of the study forms.

Table 2: Shows the opinions of experts to determine the axes of the cognitive test

Axes	Repetition	Percentage
The Origin and History of Wrestling	9	100
Basic Wrestling Skills	9	100
What is wrestling	5	55.55
Tools and Devices Used	5	55.55
Legal aspects	8	88.88

The findings reveal that the experts' approval rate varied from 55% to 100%. The researchers choose to accept the axes that achieved a minimum of 85% approval. Consequently, it was determined that the significance axis of wrestling and the axis of tools and methods utilized received percentages below 80%, resulting in their elimination. The test was confined to three axes: the genesis and history of wrestling in the hall, the essential talents required, and the principles and guidelines associated with it.

Determining the Relative Importance of the Axes of the Electronic Cognitive Achievement Test

The researchers designed a form to survey the opinions of experts, where a group of (9) experts was relied upon. This survey aims to determine the relative importance of each of the test axes, and Table (3) has been prepared to systematically clarify the results of the analysis.

Table 3: Shows the opinions of experts to determine the relative importance of the axes of the cognitive test Formulating the vocabulary of the electronic cognitive test

Axes	Relative importance	Repetition	Percentage
The Origin and History of Wrestling	20%	8	88.88%
Basic Wrestling Skills	50%	9	100%
Legal aspects	30%	8	88.88%

The researchers carefully prepared the test vocabulary in its initial form, which amounted to (60) paragraphs. They generally ranged from right and false questions, multiple choice, and phrase conversion. The following have been taken into account in the formulation of these words:

1. Measuring the level of cognitive analysis in the main axes of the research.
2. Ensure that each vocabulary measures a specific learning objective.
3. Proportionality to the age group and target sample level.
4. They are free of any hints that may guide the respondent to the right or wrong answer.
5. Achieving comprehensiveness, scientific accuracy and clarity, away from ambiguity or the possibility of multiple meanings, with an emphasis on simplicity and ease of linguistic formulation.

Determining Cognitive Levels for Cognitive Test in Wrestling

Within the framework of the behavioral objectives to be measured and the content included in the proposed program, the cognitive test was designed according to the main themes identified in the research. Cognitive levels were taken into account based on Bloom's classification of goals in the cognitive domain. The cognitive test included initial levels such as remembering, comprehension, and application.

Prepare the initial image of the cognitive test in wrestling and present it to the referees

The preliminary instrument for the assessment was developed with the intention of incorporating extensive information pertinent to the primary subjects of investigation addressed by the cognitive evaluation. The six vocabulary items were randomly allocated to various axes, accompanied with essential instructions for the test designed to streamline the response process and assure clarity of the required phrases.

The preliminary tool was introduced to nine experts in curriculum and pedagogy, along with specialists in wrestling, to solicit their insights on the following aspects:

- The extent to which the specific learning objectives are compatible with the test vocabulary.
- Scientific accuracy and language integrity in the formulation of the test vocabulary.
- The comprehensiveness of the test of the information contained in the proposed educational program.
- The suitability of the test to the nature and level of the target group.
- Clarity of the instructions provided for the test.
- Provide any additional feedback or suggestions.

The percentage of agreement among the four experts in the field of curriculum and teaching methods was more than 85%, which showed that the prepared cognitive test was appropriate. Accordingly, none of the statements associated with the main themes of the test were excluded.

Ease and Difficulty Factor and Distinction of the Test Vocabulary

After presenting the cognitive test to a group of specialized experts, the researchers applied the initial version of the cognitive test to an experimental sample of 5 students. The sample included students from inside and outside the scope of the research, during the period from January 3 to March 3, 2024. The aim of this step was to calculate the

discriminating coefficient for the test paragraphs using the following equation:
Discrimination coefficient = Ease coefficient × difficulty coefficient
There is an inverse relationship between the ease factor and the difficulty factor, in the sense that the sum of these two values is equal to one, so they can be calculated as follows:

- Ease Factor = 1 - Difficulty Factor
- Difficulty Factor = 1 - Ease Factor

Paragraphs that met the following condition were accepted:
The discriminatory coefficient should be greater than 0.30.
It is recommended to refer to Table (4) of the discrimination coefficients for the paragraphs of the cognitive test.

Table 4: Shows the discrimination coefficients for the vocabulary of the cognitive achievement test (60 items)

Paragraph Number	Discrimination Factor	Paragraph Number	Discrimination Factor	Paragraph Number	Discrimination Factor
1.	0.45	21	0.14	41	0.57
2.	0.79	22	0.55	42	0.45
3.	0.36	23	0.65	43	0.35
4.	0.90	24	0.24	44	0.77
5.	0.41	25	0.45	45	0.19
6.	0.57	26	0.62	46	0.46
7.	0.61	27	0.12	47	0.37
8.	0.35	28	0.79	48	0.45
9.	0.27	29	0.75	49	0.39
10.	0.14	30	0.34	50	0.60
11.	0.72	31	0.38	51	0.11
12.	0.67	32	0.56	52	0.58
13.	0.52	33	0.44	53	0.60
14.	0.85	34	0.13	54	0.10
15.	0.47	35	0.78	55	0.57
16.	0.57	36	0.73	56	0.63
17.	0.75	37	0.54	57	0.38
18.	0.74	38	0.65	58	0.50
19.	0.42	39	0.61	59	0.33
20.	0.69	40	0.40	60	0.28

The table indicates that approximately ten phrases were omitted due to noncompliance with the discrimination factor criterion. These phrases are numbered 9, 10, 21, 24, 27, 34, 45, 52, 58, and 60. Consequently, 50 test items remain, each exhibiting a discrimination coefficient exceeding 0.30. Therefore, this test is suitable for evaluating cognitive achievement.

The penultimate image of the Cognitive Achievement Test in Electronic Wrestling
Following an evaluation of the vocabulary from the preliminary exam by a panel of experts and the assessment of ease and difficulty coefficients, 10 statements were omitted due to their difficulty coefficients. The semi-final round of the test now comprises 50 words. The vocabulary was systematically arranged and presented to a panel of four experts in curriculum and teaching methodologies to evaluate its validity. The results showed that the experts agreed 100% on the test before the final stage, where the clarity of the relative importance of each of the test axes, the comprehensiveness of the information included in the educational program, in addition to ensuring the readiness of the test for practical application.

Grade Estimates and Correction Method
During the evaluation of the test, one point is awarded for each correct response in both the answer and error statements, as well as for each correct answer in the multiple-choice questions. A point is awarded for each successful response in the Statement Conversion section, while points are subtracted for each incorrect response. Consequently, the aggregate result of the Cognitive Analysis Test amounts to 60 marks. The rectification guide has been created to streamline the evaluation process and is included with the materials.

Scientific Parameters of the Cognitive Achievement Test in Electronic Wrestling
Test validity: The researchers re-evaluated the test tools by analyzing the content and discrimination criteria according to the following:

The judges were honest: The assessment was administered to five specialists in psychology and pedagogical techniques, together with the practical hall. They were requested to provide their assessments of the exam material, reevaluate its language, and verify its scientific accuracy and suitability for the target students' proficiency level. The language was aligned with the exam themes to guarantee compatibility with the study aims and practical applicability. The test achieved a full expert approval rate of 100%, confirming its quality and usability. Eventually, I prepared a final version of the test with fifty words ready for practical application.

Validity of the differentiation: The researchers administered the test to a survey group of five students, which included a homogeneous subset of ten students from the third stage of the current academic year 2024-2025, distinct from the primary research sample. The group also comprised an additional homogenous cohort of 10 students from the third stage at the Faculty of Physical Education and Sport Sciences at Misan University for the preceding academic year 2023-2024, who were exposed to the identical scientific content designated for that year. The assessment was conducted from March 5 to July 3, 2025,

and the results were evaluated to compute the honesty and consistency coefficients of the test.

Table 5: Shows the differences between the mean scores of the two distinct groups and the distinct jealousy in the cognitive test

Testing	Featured		Unmarked		T
	M	SD	M	SD	
Cognitive Test	46.44	5.02	36.31	5.50	5.06

The study's results reveal a statistically significant difference at the 0.05 significance level between the two distinct and undifferentiated groups, with a calculated test value of 5.06, exceeding the tabulated value at the same significance level. This clearly demonstrates the test's efficacy in differentiating individuals based on the established criteria.

Stability

The researchers determined the stability coefficient by administering tests and retesting the same sample from the undifferentiated group between March 17, 2025, and April 2, 2025, with a two-week delay. This is illustrated in Table 6.

Table 6: Shows the arithmetic mean, standard deviation, and certainty (v) between the first and second applications in the cognitive test.

Testing	First Application		Second Application		T
	M	SD	M	SD	
Cognitive Test	40.49	6.72	43.50	7.82	2.29

The findings shown in Table (6) demonstrate that there are no statistically significant differences between the initial and subsequent applications of the cognitive test. The computed value of "T" was 2.29, which is below the reference value of "T" at the 0.05 significance level. This indicates that the test is trustworthy and stable in assessing the intended objective, hence enhancing its statistical validity.

The final version of the Cognitive Achievement Test in Electronic Wrestling

Upon finalizing the computation of the scientific parameters for the knowledge assessment in the hall field, the researchers transitioned to the social dimension of the test, which comprised 50 statements, along with 7 tables illustrating the figures and the quantity of paragraphs encompassed in each aspect of the social domain.

Test Time Setting

The researchers determined the appropriate time to answer the test based on its application to the students of the third stage at the Faculty of Physical Education and Sport Sciences at Misan University for the academic year 2024-2025. This was done by relying on the basic rule derived from the following equation:

- The time taken by the first student + the time taken by the last student
- Accordingly, the total time of the test was set to be (50) minutes.

Sample homogeneity

The researchers compared the members of the research sample in the primitive and skill variables (under research) as shown in Table (7).

Table 7: Shows the arithmetic mean, standard and median deviation, and torsion coefficient in the cognitive, physical and skill variables of the two research groups.

Variables	Unit of Measurement	M	SD	Median	Torsion coefficient
Level of Knowledge Achievement	Degree	40.50	6.53	39	0.435
Physical level					
Skill Level					

The values of the torsion coefficient in this study ranged between -0.722 and 0.968 for the cognitive analysis variable, primary variables, and skill variables (under study) for the baseline samples. These values fall within the range ±1, indicating the homogeneity of the two research groups.

Sample equivalence

The researchers made the necessary measurements to determine the equivalence of the two groups (experimental-control) using the arithmetic mean, standard deviation, and (T) value individually for each element, focusing on the following variables:

Physical variables, including: stance, movement, change of levels, penetration, and offensive and defensive skills (grab, lift, throw and drop, bridge, and defense). The measurements made during the sample preparation period showed a close correlation with the research objectives.

Skill variables include

Ball pushing progression, rolling the ball, advancing on purposeful axes, pushing the ball using the flat face of the stick, hitting the ball with the flat face of the stick, and vertical straight strike. These variables were evaluated according to a standard classification table 9.

Table 8: Shows the arithmetic mean, standard deviation, and the value of (v) in growth rates and physical and skill variables for the two research groups.

Variables	Unit of Measurement	Experimental		Control		Torsion coefficient
		M	SD	M	SD	
Level of Knowledge Achievement	Degree	40.50	6.53	12.12	12.12	0.435
Physical level	Stance	2.76	0.54	2.80	0.61	0.494
	Movement	8.30	0.82	8.35	0.77	0.275
	Change of levels	2.59	0.45	2.51	0.55	0.540
	Penetration	2.45	0.80	2.37	0.77	0.246

Skill Level	Grab	8.33	1.38	8.08	1.22	0.245
	Lift	3.48	1.03	3.62	098	0.203
	Throw and drop	2.40	0.78	2.39	0.81	0.244
	Bridge	2.42	0.92	2.32	0.87	0.304
	Defense	36.40	3.66	35.38	4.11	0.408

The results indicate that there were no statistically significant differences between the experimental and control groups in the pre-measurement. The calculated "T" value ranged from 0.00 to 2.007, which is less than the critical value at the significance level of 0.05. This indicates that the two groups in the study are equal in terms of demographic and environmental variables as well as the skill variables under study, which enhances the objectivity of the final results of the analysis.

Conclusion

1. An electronic cognitive test in the sport of "wrestling" was conducted for the students of the first stage at the Faculty of Physical Education.
2. In its final version, the test included three themes containing 50 phrases distributed in three types of questions: multiple choice, true and false questions, and interconnection questions.
3. The test is relied on to assess cognitive skills, after extracting the coefficients of ease, difficulty, excellence, consistency, and other indicators necessary to ensure its quality.

Recommendations

1. Applying the proposed educational program to teach wrestling skills to the students of the Faculty of Physical Education and Sport Sciences at Misan University.
2. Learning platforms should be equipped with the necessary tools that facilitate the acquisition of information and accelerate the learning process simultaneously. This contributes to attracting learners' attention and engaging them effectively in classes, as well as providing an atmosphere of excitement and excitement to motivate them.
3. The College of Physical Education and Sport Sciences is interested in introducing modern technological methods within the academic preparation programs. This is done through the use of advanced technologies in the presentation of educational materials, whether practical or theoretical, as these methods play a great role in arousing the interest of learners and encouraging their effective participation.

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