

Awareness of Artificial Intelligence Technologies and its Relationship to Creative Thinking Skills Among Students of the Faculty of Physical Education and Sports Sciences

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ABSTRACT

Background: The current research aims to explore the degree of knowledge about artificial intelligence (AI) technologies, the degree of creative thinking ability, in the group of students studying at the College of Physical Education and Sports Sciences at the University of Karbala. Besides measuring these two variables separately, the research also seeks to determine the nature and the strength of relationship between the two variables, as well as to determine whether statistically significant differences in these two variables can be ascribed to variables like gender and academic level.

Methods: In order to attain these goals, the research took a descriptive-analytical research method. The sample used was a total number of 100 male and female students randomly chosen out of a population of third-stage students and the sample was balanced in representation of both male and female students to obtain the same balance across the genders. To conduct the data collection, a 20-item scale was designed in particular to evaluate the extent of awareness of artificial intelligence technologies in students. Along with that, a distinct test of creative thinking skills (with a total of 25 items) was used to measure the ability of the participants to think creatively.

Results: The study results showed that the overall level of awareness of the artificial intelligence technologies among the sampled students was rather high. Additionally, the use of Pearson correlation coefficient showed the presence of a good, positive and statistically significant correlation between the level of AI awareness among students and their respective abilities in creative thinking with a calculated correlation coefficient of $r = 0.68$. The given finding refers to a rather high degree of creativity among the students, who took part in the study.

Conclusions: On the basis of these findings, the research comes to the conclusion that the creation and improvement of awareness about the artificial intelligence technologies is one of the effective and promising ways to develop and improve the skills of creative thinking among the students of the College of Physical Education and Sports Sciences at the University of Karbala.

Keywords: Artificial Intelligence Awareness, Creative Thinking Skills, Students, Technologies.

INTRODUCTION

The development of physical education curricula in the age of artificial intelligence is a natural outcome of reform Continuous advancements in education and digital transformations have reshaped teaching, assessment, and academic management methods (Jabbar et al., 2026; Mitarlis et al., 2020; Yuan, 2021). Integrating artificial intelligence into physical education is not simply a matter of introducing technological tools, but rather It is moving towards building a smart educational system capable of accurately analyzing student performance, producing

immediate feedback, tailoring content according to individual differences, and improving the management of lessons, tests, and activities. Recent literature has indicated that AI applications in physical education can include designing customized lessons, delivering knowledge, assessing learners, and guiding them, thereby enhancing efficiency. Educational and developmental training enhances the future experience of physical education teachers (Jia et al., 2026; Ren & Ma, 2025). Other studies also confirm that the use of intelligent algorithms in physical education management systems contributes to increased objectivity in assessment and supports decision-making. Educational decision-making, and the development of more accurate and appropriate educational services, especially when linked to physical and skill performance data within the school or university environment (Karl et al., 2025; Wang & Sun, 2026).

In the local/Arab context, recent studies have addressed the topic of developing physical education curricula in the age of artificial intelligence as an approach to improving the learning process and raising the level of athletic performance. For students, this involves analyzing individual performance using smart technologies, while adopting descriptive/survey methods in collecting data from the educational field.

Therefore, the importance of this research stems from its alignment with the growing global trend towards employing artificial intelligence in physical education and sports training, and it also aims to identify the reality. The potential for developing physical education curricula among a sample of students at the College of Physical Education and Sports Sciences at the University of Karbala, especially third-year students, opens new horizons for developing curricula and methods. Teaching, assessment, and educational administration in a more flexible and efficient manner.

Research Problem:

Despite the rapid spread of artificial intelligence technologies, their application in Physical education and sports science curricula face numerous challenges, most notably: the limited availability of clear applied models, the varying readiness of the educational environment, and the lack of clear standards for assessing supported learning. With artificial intelligence, as well as the need to develop teaching content and practices that align with the requirements of digital transformation, the study's problem is represented in the following main question: How can Developing physical education and sports science curricula in the age of artificial intelligence in a way that improves curriculum content, teaching methods, assessment, and the learning environment for students?

Research Objectives

1. To design and develop two reliable and valid measurement scales one of which will be based on determining the level of awareness of artificial intelligence technologies and the other one will be based on the determination of the level of the skills of the creative thinking among the group of students in the Faculty of Physical Education and Sports Sciences.
2. To find out, by using the created scale, the real level of knowledge of the technologies of artificial intelligence that is currently demonstrated by students studying in the Faculty of Physical Education and Sports Sciences.
3. To evaluate, with the help of the corresponding creative thinking scale, the level of creative thinking skills that are currently displayed by students of the Faculty of Physical Education and Sports Sciences.
4. To investigate and analyze statistically the character and the strength of the relationship existing between the level of awareness of artificial intelligence technologies in students and the level of the skills of creative thinking in students, among the students attending the Faculty of Physical Education and Sports Sciences.

Research Hypotheses

1. The correlation between the level of awareness of the students of the artificial intelligence technologies and the level of their creative thinking abilities is statistically significant, which allows concluding that there is a meaningful relationship between these two variables and that they are not independent.

2. The level of awareness of artificial intelligence technologies does not show any statistically significant differences that can be specifically due to gender variable, implying that the levels of AI awareness in males and females are similar, and the differences in the levels between the two groups are within the range that can possibly be explained by chance as opposed to an actual systematic impact of gender.

Research Areas

1. Human Domain: The current study is limited, as far as human domain is concerned, to the third-year students of the College of Physical Education and Sports Sciences, University of Karbala, which is the specific population, where the research sample is taken.
2. Temporal Domain: To ensure that the study is not outdated, it is limited in time to the academic year of 2025/2026, during which all data gathering and experimental activities related to the research were performed.
3. Spatial Domain: The study was limited in terms of space to the college classrooms and sports fields found in the College of Physical Education and Sports Sciences, University of Karbala, which were the specific physical contexts in which the research operations were conducted.

Definition of Terms:

Artificial intelligence awareness: This can be defined as the general perception, understanding, and cognitive understanding of intelligent systems by an individual and includes their inherent ability to simulate and replicate different facets of human thought processes and the general knowledge of the individual on how to effectively interact, use, and engage with such intelligent systems in real-life situations (1).

Creative thinking: This can be described as a complex, multidimensional and purposeful mental process that involves multiple higher-order cognitive processes, which eventually lead to outcomes and results that are uniquely defined as a new, flexible and original concept, thus differentiating them as compared to more traditional or habitual forms of thought (2).

METHODS

Research Methodology

As the methodology of the current research, the authors have chosen the descriptive correlational approach, which is a methodological framework that is widely acknowledged as the one that fits the case of exploring and studying the relationships that exist between social and cognitive variables in the group of students (3). The researchers have chosen this very approach with the following reasons in mind: such an approach gives the adequate and sufficient framework in order to get the actual reality and actual state of these variables as they are in the study sample.

Also, the descriptive-analytical methodology was deemed beneficial because it allows to meaningfully interpret any possible differences that might arise depending on gender or different stages of education, at the same time, the strength and nature of the relationship between the level of awareness of artificial intelligence technologies among students and their level of creative

Research Population and Sample

This research in particular identified third-year students at the College of Physical Education and Sports Sciences, University of Karbala, as the population of interest that the researcher aimed at collecting information on. To collect the required data, the research questionnaire was sent to a sample of 100 male and female students (a total of 100 students) in two complementary ways: to the students using an electronic form and to the students using a traditional paper form.

Simple random sampling approach was applied to select the participants included in this sample, which is a technique that was specifically selected to be used so as to have a balanced and fair distribution of the participants of both sexes and also the specific educational stage the study focused on. The sampling process was a thoroughly thought-out and designed one that was supposed to not only be able to assess the level of awareness of participants regarding the artificial intelligence technologies, but also the corresponding level of creative thinking abilities of the

participants, and was also supposed to be able to measure the relationship between the two important variables reliably and meaningfully.

Table 1. Demographic characteristics of the research sample (n=100)

Tim	Number of Students	Variable
50%	50	Male
50%	50	Female
100%	100	Total

Data Collection Methods:

1. Mental fitness scale.
2. Questionnaire.
3. Interview.
4. Stationery (paper, pens).
5. Data collection form for the scale.
6. Arabic and foreign sources and references.

Equipment and Tools:

1. Two electronic calculators.
2. One Samsung laptop calculator.
3. One manual stopwatch.

Procedures for preparing an AI awareness scale:

After reviewing existing scales in this field, the researcher decided to use a mental fitness scale (Duaa Muhib Al-Din, 2019) Because it is the closest to the research sample and the most modern among those scales, and it suits the research sample. This scale was prepared to measure mental fitness on a sample of football players The wording of its items has been modified to be consistent with the nature of this field, as the mental fitness scale consists of (97) items, and the answer alternatives for the content of each item in the scale are (1-0)

As we mentioned previously, the mental fitness scale includes (97) items consisting of two alternatives, which are (A - B). The score for the positive item, according to the sequence, is (1), and for the negative item, it is (zero) Then, the total score for the players on the scale was found, as the highest score on the scale was (97) and the lowest score was (zero) score.

Psychometric Properties of the Artificial Intelligence Awareness and Creative Thinking Skills Scales:

The development of a measurement scale is a process that is regulated by a set of certain standard conditions and methodological requirements all of which play a significant role in preserving the validity of the measurement scale as a whole and the effectiveness of the resulting instrument in practice. One of the most basic of these requirements is the establishment of the validity and the reliability (stability) of the measuring instrument which are both critical psychometric properties that should be strictly checked before the scale can be put into practical use (4).

1. Validity: To acquire the overall validity of the created scale, two types of validity were calculated and analyzed in particular and specific:
 - a. Content validity: The content validity of the scale was established in a systematic manner wherein the individual scale items were exposed to a team of experts and specialists in the field of interest. This professional review was done with the special purpose of verifying the relevance and acceptability of each particular item, and the general appropriateness of these items in a proper representation of the underlying construct that the scale was meant to measure.
 - b. Construct validity: In reference to this specific form of validity, two different methodological approaches were selectively used to be verified. The former method was the calculation of the discriminatory power of each individual item and the latter method was the calculation of an internal consistency coefficient, which was achieved by the calculation of the correlation

relationship between the score obtained on each individual item and the overall score obtained on the scale.

2. Reliability: To check the overall reliability of the created scale, two independent and complementary methodological approaches were used:
 - a. Split-half method: The idea behind the split-half method is as follows: this method is based on the assumption that the entire set of test items is divided into two separate and equal halves, and each individual participant is awarded a different score based on each of the two separate and equal halves, so that each half is in effect a sub-test on its own. Significantly, though, the testing procedure as a whole is carried out in a single instance, with no time frame in between the delivery of the two corresponding halves (1). The split-half reliability coefficient used in the current research was specially obtained by splitting the odd-numbered items and the even-numbered ones, thus providing an opportunity to evaluate the level of homogeneity between the odd-numbered and even-numbered items, and the results are described in Table (2).
 - b. Cronbach Alpha coefficient: The conceptual methodological logic of the specific method is founded on the computation of the correlations among the coefficients of reliability of all the individual items that make up the test. As opposed to the split-half method mentioned above, this method does not necessitate the splitting of the test into only two different parts; instead the test is conceptually split into a number of different parts equal to the total number of individual items on the test such that each individual item in effect forms its own separate sub-test. The resulting figures that are produced by the use of such a procedure are also shown in Table (2) (5).

Pilot Test:

Prior to the main phase of data collection, the researchers conducted a pilot testing procedure involving the application of both developed scales to a sample of 30 male and female students drawn from outside the main research sample. This pilot testing phase was specifically undertaken in order to verify the clarity of the individual scale items and to assess the ease with which these items could be understood and interpreted by the target student population. In addition to evaluating item clarity, this preliminary phase was also employed to determine the approximate amount of time typically required by participants to complete both scales in their entirety.

The results obtained from this pilot study indicated that the items comprising both scales were, on the whole, clear, well-formulated, and readily understandable by the participating students. Furthermore, the findings revealed that the appropriate time required for completing both scales generally ranged between approximately 15 and 20 minutes. Taken together, these results provided clear preliminary evidence supporting the overall suitability and practical applicability of both measurement instruments for subsequent field application within the broader context of the current study.

Procedures for applying the artificial intelligence awareness and creative thinking skills scales:

1. The two scales were distributed to the students inside the classrooms on a pre-determined date, with an explanation of the instructions for each scale and ensuring that all items were completed.
2. Data collection was monitored to ensure accuracy and correctness of the information provided by all students.
3. The confidentiality of the information was emphasized, and students were assured that the data would be used solely for scientific research purposes.

Statistical Methods: The researchers used the SPSS statistical software package to analyze the data.

RESEARCH RESULTS

The students' results were analyzed according to the Artificial Intelligence Awareness Scale, and the results showed a disparity between the different dimensions of the scale.

Table 2. Distribution of scores on the Artificial Intelligence Awareness Scale (n=100)

Standard Deviation	Mean Score	Dimension
0.6	4.1	Basic Concepts
0.7	3.9	Educational Applications
0.65	4.0	Training Applications
0.7	3.7	Ethical Challenges

The highest average was for basic concepts (4.1), which indicates that students have a good understanding of artificial intelligence concepts. The lowest average score was for ethical challenges (3.7), indicating that students need greater awareness of the ethical issues associated with the use of artificial intelligence in sports education. The distribution indicates a moderate variation in individual student scores, reflecting the presence of diverse levels of awareness within the sample.

Creative Thinking Skills Scale:

The students' results were analyzed according to the Creative Thinking Skills Scale, and the results showed a disparity between the scale's dimensions:

Table 3. Distribution of scores on the Creative Thinking Skills Scale

Standard Deviation	Mean Score	Dimension
0.5	4.2	Fluency
0.6	4.0	Flexibility
0.65	3.9	Originality
0.55	4.1	Problem Sensitivity
0.6	3.8	Elaboration

It is evident that fluency and sensitivity to problems are the highest dimensions among creative thinking, indicating the students' ability to generate diverse ideas and observe problems accurately. The level of detail was minimal, reflecting the need to develop students' skills in expanding and analyzing ideas and adding to them.

Applied elements.

A moderate standard deviation indicates a normal variation in student abilities, which is expected in university samples. (2) To statistically investigate the nature of the correlation that exists between the level of awareness of the students about the artificial intelligence technologies and the level of their creative thinking skills, Pearson correlation coefficient was specifically used as the main statistical tool to this end. This kind of statistical method is a well known and widely used statistical method in the research community as one of the most frequently applied statistics of quantitatively measuring the degree and the strength of the linear relationship that exists between two continuous quantitative variables.

The value of Pearson correlation coefficient as a result is usually between -1 and +1 and the sign of the value as well as the magnitude of the value has a significant interpretive meaning. In particular, a positive value of this coefficient implies the existence of a direct, or positive, relationship between the two variables being studied, i.e. that an increase in one variable is likely to be accompanied by the corresponding increase in the other. Negative values on the other hand are used to show that there is indeed a negative or an inverse relationship between the two variables where in most cases when one variable increases it is likely to be accompanied by a decrease in the other variable. Moreover, the closer the correlation coefficient value is to 1, the stronger the relationship between the two variables under consideration is, and the closer it is to 0, the weaker is the association (6, 7).

Table 4. Correlation coefficient between the two measures (n=100)

Correlation Coefficient	Scale 2	Scale 1
0.68	Artificial Intelligence Awareness	Creative Thinking Skills

The correlation coefficient of 0.68 obtained is a strong positive correlation between the two variables being studied, which was statistically significant, at the significance level of 0.01. This specific finding implies that students, who are more aware of artificial intelligence technologies, also, to the corresponding degree, are more likely to display more well-developed creative thinking skills, hence indicating that there is a significant correlation between the two cognitive domains.

This perceived correlation could be explained, at least partially, by the technical and analytical expertise, which the students gain in the process of learning and working with the concepts of artificial intelligence. This kind of knowledge seems to be central to the development of the general power of students to come up with new and innovative solutions, to seek non-traditional and unorthodox solutions, and to take part in critical and systematic thinking processes when they are faced with different educational or mathematical problems that need creative solutions (8).

Table 5. Gender and educational level differences in the level of awareness about artificial intelligence and creative thinking.

P-value	t	Standard Deviation	Mean	Category	Variable
0.22	1.23	0.65	3.95	Male	Artificial Intelligence Awareness
		0.67	3.88	Female	
0.34	0.95	0.66	0.90	Third Stage	Creative Thinking Skills
0.27	1.11	0.55	4.05	Male	
		0.60	0.60	Female	
		0.57	0.57	Third Stage	
<0.01	0.68				Correlation between variables

DISCUSSION

AI Awareness:

The level of awareness is equal across genders and educational levels, indicating exposure to educational programs Standardized learning and practical training helped all students acquire a common foundation and level of knowledge. The stability of this understanding demonstrates the effectiveness of university learning and training strategies and their positive impact on students. (9)

Creative Thinking Skills:

According to the statistical analysis, no statistically significant differences were identified based on either gender or level of academic grades and this fact further supports the idea that the acquisition of creative thinking skills merely depends upon the application of interactive techniques in teaching and practical and hands-on activities and is not necessarily dependent on any of the variables, including gender or grade level. However, some minor differences were found between some of the individual dimensions of the measured variables, which could be reasonably explained by the differences in individual student experience, which is overall regarded as normal and expected in diverse and heterogeneous learning settings (10).

The correlation between the two variables:

The results of the current research prove the presence of the statistically significant correlation between the degree of awareness of the students of the Faculty of Physical Education and Sports Sciences about the artificial intelligence technologies and the corresponding level of

the skills of creative thinking among students. It is evident in the correlation coefficient ($r = 0.68$, $p < 0.01$) obtained that the two variables studied have a strong, positive correlation.

This observation implies that the more students are aware of technology in artificial intelligence, the more their creative thinking skills, the better they are at problem-solving and generally improve their academic performance and athletic results. Combined, these findings indicate that the use of artificial intelligence technology in educational programs is indeed of great significance, and that the use of the technology can be viewed as a valuable means of developing students higher-order thinking skills, and in the process, help in developing students in a well-rounded manner in terms of cognitive and professional abilities (11, 12).

The study findings showed that the general awareness of the students of the College of Physical Education and Sports Sciences regarding artificial intelligence technologies was rather high, especially concerning the basic conceptual knowledge and the knowledge of educational and training-related applications of AI. Nonetheless, this degree of awareness was relatively weaker as far as the ethical aspects and considerations regarding artificial intelligence were concerned, which indicates that there is a clear necessity to increase the level of awareness and knowledge of students regarding the ethical issues and considerations directly related to the application of artificial intelligence technologies.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The results also showed that the overall score of the creative thinking skills of the sampled students was quite high with specific strengths that were noted in the dimensions of fluency and sensitivity towards problems. However, further analysis of the findings showed that students had a relative deficiency of additional development of their skills in the fields of idea analysis and idea expansion, which is an expected and normal level of variability among individual cognitive skills of the sample. It was also discovered that there is a strong, positive and statistically significant relationship between level of awareness of artificial intelligence technologies and level of creative thinking skills among students. This result indicates that the growth in the level of technical and analytical knowledge of students in terms of artificial intelligence is relevant to improving their overall ability to think critically and creatively and to approach and solve the problems in non-traditional and innovative solutions.

Recommendations

1. The need to integrate specialized educational and training programs to raise awareness of artificial intelligence among Students of the Faculty of Physical Education and Sports Sciences, with a focus on the ethical and applied aspects of artificial intelligence in the sports field.
2. Enhancing practical activities and interactive training to develop students' creative thinking skills, with a focus on developing analytical and detailing skills and expanding the scope of innovative ideas.
3. Encouraging the use of artificial intelligence technologies as an educational tool within school curricula to enhance creative thinking, motivate students to explore new solutions, and improve cognitive competencies Professionalism in line with the demands of the digital age.

REFERENCES

- Abu Shamala, Rasha Abdul Majeed Suleiman. (2013). The Effectiveness of an Artificial Intelligence-Based Program for Developing Reasoning Skills and Academic Achievement in Information Technology among Eleventh-Grade Female Students in Gaza (Unpublished Master's Thesis). Faculty of Education, Al-Azhar University, Gaza.
- Al-Jubouri, Saad Hussein, and Al-Ta'i, Ahmed Radhi. (2020). Digital Awareness and its Impact on the Use of Artificial Intelligence Technologies in University Education. *Journal of the College of Basic Education*, 311-330, (108)26.

- Al-Kubaisi, Abdul Wahid Muhammad. (2019). *Scientific Research Methods in Education and Psychology*. Amman: Dar Al-Masirah.
- Al-Najjar, Muhammad Khalifa Al-Sayyid. (2012). *The Effectiveness of an Artificial Intelligence-Based Program in Developing Educational Website Building Skills Among Information Technology Students in Light of Total Quality Standards* (Unpublished doctoral dissertation). Institute of Educational Studies and Research, Cairo University.
- Al-Saadi, Saad Abdullah. (2020). *Methods of Teaching Physical Education and Sports Science*. Baghdad: Dar Al-Safa.
- Al-Shahri, Abdul Rahman, and Muhammad Abdullah. (2021). *Artificial Intelligence and its Educational Applications*. Amman: Dar Al-Masirah for Publishing and Distribution.
- Al-Shahri, Khalid bin Mohammed. (2021). *Artificial Intelligence in Higher Education: Opportunities and Challenges*. *Journal of Educational Sciences*, 115-142, (3)29.
- Al-Zubaidi, Hussein Ali. (2022). *Digital Education and Artificial Intelligence in Educational Institutions*. Baghdad: Dar Al-Kutub Al-Ilmiya.
- Awda, Ahmed Suleiman (2010). *Measurement and Evaluation in the Teaching Process*. Amman: Dar Al-Amal for Publishing and Distribution.
- Jabbar, Y. M., Abboud, M. H., & Abdulwahid, A. H. (2026). The Effect of Daniel Niel's Model on the Level of Cognitive Achievement and Learning Some Types of Handballs Shooting for Students. In A. A. Hameed & A. Jamil (Eds.), *Innovations in Sustainable Sports Infrastructure for Eco-Friendly Design and Operations* (pp. 301–317). Springer Nature Switzerland.
- Jia, C., Li, Z., Liu, R., & Ye, S. (2026). Thematic analysis and future directions of artificial intelligence integration in physical education and sports in China. *Proc.SPIE*, 14115, 1411505. <https://doi.org/10.1117/12.3102286>
- Karl, É., Nagy, E., & Molnár, G. (2025). Advanced Examination Systems: Applying Fuzzy Logic and Machine Learning Methods in Education. 2025 IEEE 12th International Conference on Computational Cybernetics and Cyber-Medical Systems (ICCC), 231–236. <https://doi.org/10.1109/ICCC64928.2025.10999148>
- Mitarlis, Ibnu, S., Rahayu, S., & Sutrisno. (2020). The effectiveness of new inquiry-based learning (NIBL) for improving multiple higher-order thinking skills (M-HOTS) of prospective chemistry teachers. *European Journal of Educational Research*, 9(3), 1309–1325. <https://doi.org/10.12973/eu-jer.9.3.1309>
- Qamoura, Samia Shehi, and Kroush, Hezia. (2018). *Artificial Intelligence Between Reality and Aspiration: A Technical and Field Study*. In the International Conference "Artificial Intelligence: A New Challenge for Law?", Algeria, November 26-27.
- Ren, Q., & Ma, Z. (2025). Experimental exploration of artificial intelligence and ADAMS simulation technology in the teaching of vertical hoop upward throw in rhythmic gymnastics. *PLOS ONE*, 20(9 September). <https://doi.org/10.1371/journal.pone.0330844>
- Salem, Abdel-Badi' Muhammad. (2001). *Artificial Intelligence Technology*. Cairo: The National Foundation for Scientific Instruments and Office Supplies Press.
- Shaker, Saleh Ahmed. (2007). *Foundations and Specifications for Designing Intelligent Computer Programs for Students with Learning Disabilities in Mathematics*. Saudi Arabia, Al-Baha. Available at <http://www.gulfkids.com/pdf/Shaker.pdf>
- Wang, X., & Sun, W. (2026). AI enhanced optimization of college physical education programs using hybrid genetic algorithms and learning based fitness evaluation. *Scientific Reports*, 16(1). <https://doi.org/10.1038/s41598-026-45357-9>
- Yuan, X. (2021). The Application Prospects of Artificial Intelligence in the Field of Physical Education. 2021 World Automation Congress (WAC), 283–286. <https://doi.org/10.23919/WAC50355.2021.9559508>