



PEDAGOGICAL CONTENT KNOWLEDGE (PCK) AND ITS IMPACT ON THE SCIENTIFIC KNOWLEDGE OF SCIENTIFIC RESEARCH FOR MASTER'S STUDENTS IN SOME FACULTIES OF PHYSICAL EDUCATION AND SPORTS SCIENCES

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Abstract

The current research aims to build a measure of educational content knowledge ((PCK), and to prepare a measure of scientific knowledge of scientific research methods and to apply these three measures to master's students in some faculties of physical education and sports sciences to identify the level of these standards among students, as well as to identify the correlations between the two measures. To achieve the objectives of the research, the researcher used the descriptive approach in the two methods (survey – correlation) As for the research community, it was represented by graduate students (Masters) at the stage of writing the research, from (9) faculties of physical education and sports sciences for the academic year (2020-2021) and (2021-2022). Their number is (370) students, with a rate of (216). Students from the first academic year and (154) students from the second academic year. As for the research sample, the researcher determined her research sample randomly from the students of the selected colleges, whose number is (270) students, by (160) students from the first academic year to represent the sample of building standards, and (110) students of the second academic year to represent the sample of the main experiment, then the researcher built educational content knowledge (PCK) consisting of (13) items, and the researcher also prepared a measure of scientific knowledge for scientific research methods, as the researcher used the scale prepared for the researcher (Akram Adnan Naghimish It consists of (44) items in a multiple choice format with three alternatives (a, b, c). Then the researcher applied the three measures to master's students from (8) faculties of physical education and sports sciences, and after obtaining the results, the researcher used the statistical program (SPSS) to analyze the data and show the results. Accordingly, the researcher concluded that the educational content knowledge (PCK) has an impact on the scientific knowledge of scientific research methods for master's students.

Introduction

Over the past four decades, human societies have witnessed transformations in various fields of life as a result of the development of information and communication technology, the information revolution, discoveries and inventions, and the improvement of the public and higher education system, as scientific research has had pivotal contributions to the development

of human knowledge fields. At the present time, human societies rely on scientific research to find solutions to the problems facing these societies. The scientific research is based on the scientific methodology in solving these problems. Scientific research is considered one of the pillars on which university education is based in its contemporary concept and a key factor in the development and improvement of the internal and external efficiency of the higher education system, as higher education institutions always seek to enhance the development and development of their contributions in the field of scientific research so that they resonate in the world and be able to compete with their counterparts. It is one of the international universities that reach advanced ranks in global rankings. Scientific research is also the main artery to achieve the economic, social and cultural renaissance of society. Recent trends in the programs for preparing researchers in developed countries emphasized the necessity of taking care of researchers. This trend has emerged as a new method of teaching, and this method is based on a program in which the knowledge, attitudes, and behavior required to be performed by the person in charge of the teaching process are determined. It also emphasized that it is not enough for teachers to be familiar with the educational material, but rather that they must possess the necessary skill and effectiveness to successfully perform the teaching profession. In view of the role and importance of the educational institution, this institution must include a professional cadre that is characterized by certain qualifications and characteristics through which it can prepare the educational positions in a good way, through which the philosophy and goals of the general educational institution are achieved, because the knowledge society and what it requires of change in education policies and objectives must be changed. In the role of the teacher in the educational educational process in terms of goals, content, methods, strategies and evaluation methods, and translating them into an educational reality in order to provide education that depends on the teacher's competencies and awareness of the tasks of the educational process, that educational content knowledge (PCK) represents one of the contemporary models in the field of preparing and qualifying training Teachers to raise their teaching performance in accordance with best practices. The model is based on diversity and integration between theoretical knowledge of technology and knowledge of the content of the subject, with knowledge of teaching methods as main requirements for effective teaching using educational technologies. It aims to acquire necessary competencies for teachers that enable them to integrate technology into education. The subjects taught in the College of Physical Education have multiple objectives, many methods, and various means, and they are not only education, even if education is part of it, and it is not training or habituation, but it is a process that also focuses on the methods and methods that the learner adopts in obtaining information from different sources. .Because the scientific research lesson is one of the important lessons in the faculties of physical education and sports sciences, and it is one of the subjects included in the college curriculum, so the process of advancing it has a great impact on preparing students mentally Hence, it can be said that the importance of the current research stems from the fact that teaching scientific research in the faculties of physical education needs study and research, because what the teaching position needs within the lecture is interaction between the teacher and the student in order to improve the level of teaching.

Research problem

The research problem lies in answering the following questions:

1. What is the reality of educational content knowledge (PCK) among master's students in the College of Physical Education and Sports Sciences, Al-Muthanna University?
2. What is the reality of scientific knowledge in scientific research among master's students in some faculties of physical education and sports sciences?
3. Does educational content knowledge (PCK) affect scientific knowledge in scientific research methods?

Research Objectives

1. Build a measure of educational content knowledge (PCK) and its application to postgraduate students in some faculties of physical education and sports sciences.
2. Preparing a scientific knowledge scale for scientific research methods and applying it to postgraduate students in some faculties of physical education and sports sciences.
3. Identify the impact of educational content knowledge (PCK) on scientific knowledge in scientific research methods.

Imposing research

Educational content knowledge (PCK) has an impact on scientific knowledge in scientific research methods.

Areas Of Research

- The human field: Master's students in the research writing stage from (9) faculties of physical education and sports sciences for those accepted in the years (2020-2021) and (2021-2022)
- The temporal field: for the period from 1/30/2022 AD to 3/1/2023 AD.
- Spatial field: Discussion halls allocated to (9) faculties.

Research Terms

Pedagogical Content Knowledge (PCK): It is the ability of the teacher to understand the relationship between the methods and methods of teaching used and the scientific content that is being taught. It supports the achievement of its objectives according to different educational contexts, and teaching methods and methods may differ from one subject to another in the same specialization.

Research methodology and field procedures

Research methodology

The methodology represents a set of rules and procedures that the researcher must follow in order to reach the targeted results. It is the research tool in controlling the research, and adjusting its procedures according to the standard procedures and rules characteristic of each approach. It is one of the most important steps that lead to the success of the research, as the method Or an organization, strategy, or general plan that relies on a set of foundations, rules, and lines that benefit them in achieving the goals of research or scientific work” (Muhammad Owais: 2003: 151) Accordingly, the researcher used the descriptive approach (Ali Samoum: 2014: 16) in two different ways:

- A. The survey method: by collecting data on the reality of educational content knowledge and scientific knowledge in the scientific research method.
- B. Correlative Relationships Method: This is to reveal the relationships between the

educational content knowledge (PCK) with the scientific knowledge of the scientific research method and the influence between them, to extract the factors that lie behind the nature of those relationships.

The research community and its sample

The researcher identified her research community, which is represented by postgraduate students (Masters) at the stage of writing the research, from (9) faculties of physical education and sports sciences for the academic year (2020-2021) and (2021-2022), whose number is (370) students, with a total of (216) students from the first academic year and (154) students from the second academic year. As for the research sample, which is part of "the original community that contains some elements from which it is selected in order to study the characteristics of the original community" (Muhammad Al-Sayrafi: 2008: 186). The researcher selected a sample for her research, in a random manner, from the students of the selected colleges, whose number is (270) students, with (160) students from the first academic year to represent the sample of building standards, and (110) students from the second academic year to represent the sample of the main experiment, and table (1) shows that

Table (1) Shows the number of the research community and its sample

number main sample	The number of students for the year 2021-2022	number construction sample	The number of students for the year 2021-2020	Colleges of physical education and sports science	No
11	14	23	26	Muthanna University	1
19	24	25	32	Al-Qadisiyah University	2
13	18	19	29	University of Kufa	3
7	11	10	16	Kufa University for Girls	4
18	28	22	27	University of Babylon	5
10	16	17	20	Albasrah university	6
12	17	14	19	Wasit University	7
9	13	12	18	Dhi Qar University	8
11	13	18	29	Karbala University	9
110	154	160	216	the total	

The means, tools and devices used in the research

What is meant by the method or method that the researcher can solve her problem, whatever it is, such as tools, data, samples, or devices, and for this she used many of them in order to reach that:

Means of collecting information

Arabic and foreign sources.

Questionnaire form.

Data collection form.

Google Drive form.

Tools and devices used in the research

Pens, papers.

Electronic calculator.

DELL laptop.

Steps to building a measure of educational content knowledge

The aim of building knowledge of the educational content

Identifying the level of knowledge of educational content for master's students in scientific research methods in some faculties of physical education and sports sciences.

A sample of building the educational content knowledge scale

The sample of constructing the educational content knowledge scale was represented by master's students in the thesis writing stage from nine faculties of physical education and sports sciences, whose number is (160) male and female students.

Collecting and preparing the items of the educational content knowledge scale

In order to develop the initial formula for the items of the educational content knowledge scale, the researcher looked at a group of sources and some previous studies in the field of teaching methods. The researcher formulated (13) items.

Determine the method of formulating educational content knowledge

The specifications for writing or drafting the paragraphs of the scale should be (Sami Mohsen: 2013: 82)

1. That the phrases are related to the objective of the scale.
2. Not in the past tense.
3. The sentences should be short.
4. The paragraph should carry one meaning and idea.
5. The paragraph should be clear and understandable.
6. Keep in mind that the expressions are negative and positive.
7. Avoid statements that refer to facts accepted by all individuals.
8. To take into account impartiality in the answer (acceptance and rejection)

Determine the powers of the paragraphs of the educational content knowledge scale

After collecting the paragraphs, the researcher prepared a questionnaire form for the educational content knowledge paragraphs (PCK), and presented it to a group of experts and specialists, numbering (17), for the purpose of determining the validity of the paragraphs, as the form included three fields, and the experts and specialists should put a mark (Ka^2) on The designated box is (fit - not fit) or needs to be modified. If there is a paragraph that the researcher did not mention, please mention it in the notes. After collecting and unpacking the data, the researcher used the (Ca_2) test and the percentage to identify the valid items for each scale. Table (2) shows that.

Table (2) The opinions of experts and specialists to determine the validity of the paragraphs of the educational content knowledge scale (PCK).

Statistical significance	significance level	ka ²	percentage	validity		number of experts	Paragraph
				Does not fit	Repair		

fit	0.000	13,235	94.12%	1	16	17	1
fit	0.002	9,941	88.24%	2	15	17	2
fit	0.000	17	% 100	0	17	17	3
fit	0.008	7,118	82.35%	3	14	17	4
fit	0.000	17	% 100	0	17	17	5
fit	0.000	13,235	94.12%	1	16	17	6
fit	0.002	9,941	88.24%	2	15	17	7
fit	0.008	7,118	82.35%	3	14	17	8
fit	0.000	17	% 100	0	17	17	9
fit	0.000	17	% 100	0	17	17	10
fit	0.000	17	% 100	0	17	17	11
fit	0.002	9,941	88.24%	2	15	17	12
fit	0.008	7,118	82.35%	3	14	17	13

Table (2) shows the acceptance of all the items that were presented to the experts and specialists, whose significance percentage for the (Ca²) test was less than the error percentage (0.05), which indicates that they are valid.

Keys to correcting the paragraphs of the educational content knowledge scale

The step of calculating the degree obtained by the sample members on the scale is one of the important steps, and the degree depends on the method of building the paragraphs, the number of answer alternatives, and after the approval of the experts on the answer and wording alternatives. The researcher relied on the five-point Likert model, as it is one of the common methods of measurement because this method is characterized by the following (Khairuddin: 1997: 67)

1. It reduces guesswork and chance
2. Likert method is one of the best methods in predicting behavior or phenomenon
3. An easy and highly stable method that determines the degree of attitude of the responding individual towards the problem.
4. It allows us to select a large number of phrases that are highly correlated in the scale as a whole.
5. Provide us with information about the subject to respond to each paragraph.
6. It is distinguished by its ease of correction and construction, and due to its many alternatives, the answer is accurate.
7. It does not require much effort to calculate the values and weights of the expressions.
8. Accurately shows the degree of individual orientation towards the subject.

The alternatives to the answer were given grades (5-4-3-2-1), respectively, as shown in Table (3), and accordingly, the degree of the educational content knowledge scale ranges from (12-60) degrees.

Table (3) It shows the scale alternatives, the direction of the paragraphs, and the weights of the alternatives for the educational content knowledge scale

never	Scarcely	sometimes	mostly	always	alternative direction
1	2	3	4	5	the weight

Instructions for the educational content knowledge scale (PCK)

The process of setting or preparing the scale instructions is of great importance that cannot be underestimated in the success of the process of conducting or performing the test. Studies have proven the importance of the role that these instructions play in changing or influencing the test results, which makes it difficult to compare the results of one test in different situations. These instructions (Amin Khouli: 1997: 63)

- Answer all paragraphs.
- There is no right or wrong answer, but rather your answers are based on how you feel.
- Choose only one answer out of five alternatives.
- The result of the paragraph will be deleted if more than one option is answered.
- The information provided is for scientific research purposes only.

Exploratory experience Knowledge of educational content

After the researcher finished developing the instructions for building the scale, she conducted an exploratory experiment for a scale to know the educational content, on the master's students in the College of Physical Education and Sports Sciences, Al-Muthanna University, who numbered (10) students, on Wednesday 4/5/2022

The aim of the experiment is:

1. Recognizing the clarity of the scale paragraphs and its instructions.
2. Identifying the errors and obstacles that the researcher faced during the main experiment.
3. Identify the potential of the assistant team.
4. Identifying the time required to answer the scale and the time it took to answer each scale
5. Knowing the time needed to correct one form.

Initial application of the educational content knowledge scale (PCK)

After the educational content knowledge scale (PCK) became ready in terms of paragraphs and instructions, the researcher proceeded to apply them to master's students from (9) faculties of physical education and sports sciences, whose number is (160) students. Table (4) shows the dates of the experiment.

Table (4) Shows the dates of the initial application of the PCK educational content knowledge scale

University Name	the date	No
Muthanna University	For the period from 5/16/2022 to 5/26/2022	1
Al-Qadisiyah University	For the period from 18/5/2022 to 30/5/2022	2
University of Kufa	For the period from 19/5/2022 to 30/5/2022	3
/ University of Kufa for girls	For the period from 5/19/2022 to 5/31/2022	4
University of Babylon	For the period from 5/22/2022 to 6/3/2022	5
Albasrah university	For the period from 5/24/2022 to 6/9/2022	6
Wasit University	For the period from 5/25/2022 to 6/6/2022	7

Dhi Qar University	For the period from 5/29/2022 to 6/7/2022	8
Karbala University	For the period from 30/5/2022 to 8/6/2022	9

Correcting the items of the PCK educational content knowledge scale

After the process of sorting the answer forms for the sample, it became clear that there were no invalid forms and no errors in the answer by leaving some paragraphs unanswered or by answering more than one alternative for one paragraph, and accordingly the researcher corrected all the forms and it took the process of correcting one form From (5-10) minutes, and it was relied upon in the statistical analysis of the items of the scale for the purpose of extracting the discriminatory power, validity and stability.

Analysis of the items of the PCK educational content knowledge scale

The aim of statistically analyzing the expressions of the scale is to improve the quality of the test by discovering the weakness of the paragraph and then working on reformulating or excluding it if it is not valid. Replace, add or rearrange these paragraphs.

First - extracting the discriminatory ability

It means (the ability or possibility of the paragraph to distinguish individual differences between the testers who know the correct answer about it and those who do not know it) (Sabah Hussain: 2001: 79), and that the main goal of this step is to analyze phrases is to keep the paragraphs with high discrimination, which are the good ones In the test (Khair El-Din: 1990: 81), and in order for the researcher to be able to extract the paragraph discrimination coefficient, the researcher worked on the following:

1. Arranging the results of the individuals in descending order, who got the highest scores in one group and the individuals who got the lowest scores in another group.
2. The researcher determined (32)% for the students who obtained the highest scores on the scale, and (32)% for the students who got the lowest scores on the scale, to be two groups consisting of (51) students for each group, as (Kelly) indicated that Use a percentage of (27%) if the number of sample members is large, but if the number of sample members is limited, there can be flexibility to move at a rate of (25% to 33%)
3. The researcher extracted descriptive data for each group (the arithmetic mean and standard deviation).
4. The researcher used the (t) test for independent samples to compare the scores of the two groups (higher and lower) as shown in Table (5)

Table (5) It shows the discriminatory ability of the items of the (PCK) scale

Statistical significance	significance level	calculated t value	lower group		senior group		Paragraph
			p	s	p	s	
moral	0.008	2,697	1,809	2,922	1,558	3,824	1
moral	0.001	3,499	1,635	2,745	1,082	3,706	2
moral	0.001	3.31	1.16	2,882	1,346	3,706	3
moral	0.000	4,081	1,271	2,941	1.10	3,902	4
moral	0.002	3.21	1,385	2,961	1,265	3,804	5
moral	0.000	8,199	0.977	2,255	1,074	3,922	6
moral	0.000	4.75	1,115	2,726	1,296	3,863	7
moral	0.000	6,708	0.985	2,902	0.903	4,157	8

moral	0.000	3,986	1,084	3.51	0.948	4,314	9
moral	0.000	4,835	1,364	3.02	0.705	4,059	10
moral	0.000	5,518	1,532	3,177	0.61	4,451	11
moral	0.000	5,203	1,283	2,588	1,108	3,824	12
moral	0.000	7,588	1,447	1,784	1,398	3,922	

The above table shows that the value of the significance level of the (t) test for independent samples was less than the error rate (0.05). This means that there are differences between the scores of the upper and lower groups, which indicates the ability of all paragraphs to discriminate

Secondly - internal consistency

The method of internal consistency means the extent to which the paragraphs relate to each other within the test or measure and the extent to which each paragraph relates to the test as a whole. Its totality is high. This was evidence of the internal consistency of the test or the scale as a whole, as the total score of the test is the criterion used to verify its validity.

- It provides us with a homogeneous scale in its paragraphs so that each paragraph measures the same goal that the scale measures as a whole.
- The ability to highlight the correlation between the paragraphs of the scale and the areas of the scale with the scale as a whole.

The researcher used the data of (160) students to extract the internal consistency as follows Correlation coefficient of the paragraph score with the overall scale score To find the validity of the internal consistency, the Pearson simple correlation coefficient formula was used between the paragraph score and the total score of the questionnaire and for all its fields. Accordingly, the paragraph whose correlation coefficient with the total score is low is deleted, given that the paragraph does not measure the phenomenon measured by the entire test, and Table (7) shows this.

Table (7) It shows the values of the item score correlation coefficient with the overall questionnaire score of the educational knowledge and content scale (PCK).

Statistical significance	R value	Paragraph numb	Statistical significance	R value	Paragraph numb	Statistical significance	R value	Paragraph numb	Statistical significance	R value	Paragraph numb
moral	0.715	10	moral	0.734	7	moral	0.727	4	moral	0.746	1
moral	0.767	11	moral	0.735	8	moral	0.715	5	moral	0.755	2
moral	0.676	12	moral	0.733	9	moral	0.708	6	moral	0.788	3
moral	0.782	13									

Table (7) shows that there is a correlation between the score of each paragraph with the score of the scale as a whole, to which the paragraph belongs, as the significance level of the Pearson test appeared smaller than the error rate (0.05), and this indicates a significant correlation.

Psychometric properties of the educational content knowledge scale (PCK)

The psychometric characteristics of the standard characteristics of the test or scale are an important and essential step in constructing the scale or tests because its standard characteristics indicate the accuracy of all previous construction procedures. Re-measure it. The measurement owners almost agree on some of the standard characteristics that should be verified in the paragraphs of the measurements, which are the discriminatory power of the paragraphs and their validity coefficients (Ahmed Suleiman: 1997: 40.)

Among the most important standard characteristics of the scale that the measurement specialists emphasized are the two characteristics (honesty and stability), as well as the criteria, as the accuracy of the data or the degrees that we obtain from the scales depends on them.

The validity of the scale

The concept of validity is one of the most important basic concepts in the field of tests and measurement. The validity of the test is defined as (the extent to which the measurement tool is useful for a specific goal) (Marwan Abdel-Majeed: 1999: 77). There are many types of validity, and these types are only methods used in collecting evidence. Which proves the enjoyment of the scale, so the researcher proceeded to verify the validity of the scale by using two types of validity.

First - the apparent sincerity

It is intended that the test outwardly measures what was set to measure it (Mustafa Hussein: 1999: 53), and this kind of validity was achieved when the researcher presented the items of the PCK scale to a group of experts and specialists in the field of teaching methods, so that it makes the researcher reassured of their opinions and takes the provisions that agree. Most of them are as shown in Tables (2)

Secondly, the validity of the hypothetical formation

As for the validity of the hypothesis formation, which is also called the validity of the construction or the validity of the concept, it depends on the empirical verification of the extent to which the scale scores match the concepts that the researcher relied on in her numbers, which is the extent to which the test measures the formation of a hypothesis or a specific feature by identifying the components that make up the concept according to the theory Moeinah (Zakaria Muhammad: 1999: 61): The validity of the construction is one of the most important types of validity in the stages of building the scale because it constitutes the theoretical framework for the scale, and its calculation is more complex than the other types of validity because it depends on theoretical assumptions that are verified empirically. The researcher verified the validity of the hypothetical formation or construction by the following means:

The two end groups

Distinction is one of the (standard) psychometric characteristics that indicate the ability of the scale paragraphs to distinguish between the subjects so that the scale can detect individual differences between individuals in the measured trait on which the psychological measurement is based, because it distinguishes between individuals who have obtained high scores in the trait that All items are measured on individuals who score low. To achieve this, the researcher adopted the method of the two end groups in calculating the discriminatory power of the scale items using the statistical bag (SPSS) as in Table (5)

Internal Consistency

The internal consistency of the PCK scale was confirmed by knowing the correlation of the

paragraph with the scale, as in Table (6)

The stability of the scale

The fixed test is (the test that gives similar results or the same results if applied more than once in similar circumstances) (Nader Fahmy: 2005: 93), and to verify the stability of the scale, the researcher used:

First - the half-partition method

This method relies on dividing the paragraphs of each scale into two equal halves, and this method has advantages (Sami Muhammad: 2001: 77) (economy in effort and time, and it eliminates the impact of changes that occur on the subject’s scientific, psychological and health status, which may affect the level of his performance), and to calculate Reliability In this way, the data of questionnaires (160) students were used, and they were divided into two halves in an odd and even manner, with (80) forms for odd numbers and (80) forms for even numbers. The reliability coefficient was extracted between the two halves of each measure using the simple Pearson correlation coefficient. The value of the stability coefficient of half of the test was modified by the stability significance equation (Spearman Brown) as in Table (7)

Table (7) It shows the stability coefficients of the retail half test with the correction factor of the PCK scale

Statistical significance	significance level	Factor Spearman Brown	Statistical significance	significance level	Factor Pearson link
moral	0.001	907	moral	0.001	0.941

The above table shows that the level of significance of the Pearson correlation coefficient and the Spearman correlation coefficient is smaller than the error rate (0.05), which means that there is a significant correlation between the two halves of the scale, and this means that the scale has stability

Gauge (PCK) In Its Final Form

After the researcher conducted the statistical operations and made sure of the discriminating ability of the items of each scale and the coefficient of internal consistency and the scientific bases of the scale, the scale became composed of (13) items.

Steps for preparing a scale of scientific knowledge for scientific research methods

The aim of preparing the scientific knowledge scale for scientific research methods

Identifying the level of scientific knowledge of scientific research methods for master's students of some faculties of physical education and sports sciences

Collecting and preparing the items of the scientific knowledge scale for scientific research methods:

The researcher looked at many sources and previous studies, and accordingly the researcher relied on a scale prepared by (Akram Adnan Nghimish: 2020: 154) because the scale measures the same goal that the researcher seeks, as the scale consists of (44) multiple-choice items (a, b), c)

Determine the validity of the scientific knowledge scale for scientific research methods

The researcher prepared a questionnaire form for measuring scientific knowledge, and presented it to a group of experts and specialists, numbering (15) experts, in order to express their opinions on the validity of the scale. Experts with (agree, disagree) results were analyzed,

using (Ca²) and percentage as shown in Table (8)

Table (8) Opinions of experts and specialists to determine the validity of the scientific knowledge scale for scientific research methods

Statistical significance	significance level	value ka ²	percentage	not agree	OK	number of experts	the scale
Repair	0.000	15	100 %	0	15	15	Scientific knowledge of scientific research

Table (8) shows the validity of the scientific knowledge scale, as it obtained an agreement rate of (100)

Scientific knowledge scale instructions for scientific research methods.

The process of setting or preparing the scale instructions is of great importance that cannot be underestimated in the success of the process of conducting or performing the test. Studies have proven the importance of the role that these instructions play in changing or influencing the test results, which makes it difficult to compare the results of one test in different situations. These instructions:

1. Answer all paragraphs.
2. The result of the paragraph will be deleted if more than one option is answered.
3. There is only one correct answer out of the three alternatives.
4. The information provided is for scientific research purposes only.

Exploratory experience of scientific knowledge scale of scientific research methods

After the researcher completed setting the instructions for the scale, she conducted an exploratory experiment for the scientific knowledge scale of scientific research methods on master's students in the College of Physical Education and Sports Sciences, Al-Muthanna University, who numbered (24) students on 5/26/2022 AD.

The aim of the experiment is

1. Recognizing the clarity of the scale paragraphs and its instructions.
2. Identifying the time required to answer the scale and the time it took to answer each scale
3. Knowing the time needed to correct one form.

Main Experiment

After the three standards were ready for application, the researcher and the assistant work team proceeded to apply the standards to the main research sample represented by master's students in the thesis writing stage, who numbered (110) students from (9) faculties of physical education and sports sciences for students accepted in the year (2021-2022), as The researcher applied the experiment during the following days:

Table (9) Dates of application of the main experience of the standards

University Name	the date	No
Muthanna University	2022/1/13 to For the period from 8/1/2022	1
Al-Qadisiyah University	2022/1/18 to For the period from 10/1/2022	2

University of Kufa	2022/1/16 to For the period from 9/1/2022	3
University of Kufa / for girls	2022/1/17 to For the period from 9/1/2022	4
University of Babylon	2022/1/18 to For the period from 10/1/2022	5
Albasrah university	2022/1/19 to For the period from 11/1/2022	6
Wasit University	2022/22/1 to For the period from 1/15/2022	7
Dhi Qar University	2022/20/1 to For the period from 1/12/2022	8
Karbala University	2022/23/1 to For the period from 1/17/2022	9

The statistical methods used in the research

The researcher used the statistical program (SPSS v27) for statistical processing and the program (EXCEL)

1. Arithmetic mean.
2. Standard Deviation.
3. Hypothetical mean.
4. Test value (Ca2)
5. The t-test value for one sample.
6. The t-test value for two independent samples.
7. Pearson correlation coefficient.
8. Spearman correlation coefficient.
9. The value of the analysis of variance ((F))

Presentation, analysis and interpretation of the results

Presentation of the results of the Pedagogical Content Knowledge (PCK) scale

Table(10) It shows the values of the arithmetic mean, the hypothesis, the standard deviations, and the value (t) of the educational content knowledge scale (PCK).

Statistical significance	significance level	value (t)	hypothetical mean	standard deviation	Arithmetic mean	The number of paragraphs	the scale
moral	0.000	9,464	39	3,395	42.06	13	Pedagogical Content Knowledge PCK (

The table shows that the significance ratio of the (t) test for one sample of the educational content knowledge (PCK) scale was smaller than the error rate (0.05), and this means that there are significant differences. The hypothetical mean, which indicates that the sample has educational content knowledge (PCK)

Presenting the results of scientific knowledge using scientific research methods

Table (11) Shows the value of the arithmetic mean, hypothesis, standard deviation, and the value (t) of the scientific knowledge scale for scientific research

Statistical significance	significance level	value (t)	hypothetical mean	standard deviation	Arithmetic mean	The number of paragraphs	the scale
moral	0.000	11,403	22	3,027	28.29	44	Scientific knowledge for scientific research methods

The table shows that the percentage of significance for the (t) test for one sample of the measure of scientific knowledge in the scientific research methodology was smaller than the error percentage (0.05), and this means that there are significant differences. Hypothesis, which indicates that the sample enjoys scientific knowledge of scientific research methods.

Results of the impact of educational knowledge and content on practical knowledge in scientific research

Table (12) Analysis of variance for the interaction of independent effects together with practical knowledge of scientific research

effect size	significance level	value F (average contrast	degrees of freedom	Total variance	source of contrast
0.403	0.000	72,947	402,614	1	402,614	Modified form
0.105	0.001	12,656	69,850	1	69,850	p capture
0.403	0.000	72,947	402,614	1	402,614	PCK
			5,519	108	596,077	The error
				110	89,040,000	total
				109	998,691	corrected total

When studying Table (12), we notice that PCK greatly affects scientific knowledge in scientific research because the value of the significance level of the interaction appeared to have a significant significance, and this is confirmed by the value of the effect size (Eta) amounted to (0.403), and according to the interpretation of this value, the interaction has a significant impact on scientific knowledge Because the effect size value was greater than (0.14)

Discuss the results

The results of the tables show the existence of significant correlations between the scientific knowledge of the scientific research methods with the knowledge of the educational content

((PCK). It also motivates them to participate with the teacher, and taking into account the individual differences of students helps in achieving the objectives of the lesson, and is consistent with the nature of the students' mental activity. (Al-Kubaisi: 2014: 143)

And whenever the teacher has knowledge of everything that is used in the specialized knowledge of the content (CP), then he can create a classroom environment supportive of effective learning. The level of scientific knowledge of scientific research methods. The researcher believes that teaching is a science and an art, because science and art in teaching are intertwined and the teacher acquires them through preparation and practice for the theoretical and applied aspects. The theoretical is a science and the applied is an art. All teachers possess knowledge, but most of them do not possess art in teaching, and art in teaching means choosing the appropriate method to convey information to the student's mind easily and easily, as many of the academic subjects are scientifically difficult, but the teacher's style and method of presenting the subject and his respect for his students makes students understand the subject and succeed in it despite its difficulty, and therefore, not everyone who holds an academic degree is fit to teach because he possesses science and does not possess art, and his place is scientific institutions in which he does not deal with students.

By presenting and analyzing the research results, the researcher reached the following conclusions:

1. The educational content knowledge scale (PCK), which the researcher built, and applied to master's students in some faculties of physical education and sports sciences, enables the measurement of what was set for it.
2. The measure of scientific knowledge of the scientific research methodology, which was adopted by the researcher, and applied to master's students in some faculties of physical education and sports sciences, was able to measure what was set for it.
3. Postgraduate students in the selected faculties of physical education and sports sciences enjoy educational content knowledge (PCK) and scientific knowledge of scientific research methods.
4. The results showed that there is a significant correlation between educational content knowledge (PCK) and scientific knowledge of scientific research methods.

Recommendations

Based on the research findings, the researcher recommends the following:

1. Benefiting from the two measures of educational content knowledge ((PCK), which the researcher built to measure the level of educational content knowledge for postgraduate master's students in the College of Physical Education and Sports Sciences.
2. Benefiting from the scale of scientific knowledge of scientific research methodologies, which was applied by the researcher, in order to identify the level of scientific knowledge of scientific research methodologies for postgraduate master's students in the College of Physical Education and Sports Sciences.
3. The researcher in Diversity advises the use of teaching methods when teaching scientific research methods, in order to raise the factor of effects and suspense for students and not make them feel bored.
4. Teachers of scientific research methods should use the field side by holding lectures outside the classroom and going to the halls where practical lectures are held and

revealing problems that students suffer from while learning skills and finding ways and solutions to those problems.

5. Conducting studies similar to the application of the educational content knowledge scale (PCK) on a subject other than scientific research from the curriculum used in the College of Physical Education and Sports Sciences, whether the subject is theoretical or practical.

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Supplements Accessory (1)Final version of the Educational Content Knowledge (PCK) questionnaire
 good greeting.

In your hands is a list of paragraphs that measure educational technical knowledge of the TIPAK model for teachers of scientific research. The researcher asks you to answer the paragraphs of the list after reading them carefully, noting the instructions below before starting the answer:

1. The list consists of (13) items.
2. All paragraphs should be answered, and no paragraph should be left unanswered.
3. Answer the paragraphs honestly and accurately.
4. Choose the response that applies to you the most.
5. There is no right answer and wrong answer.
6. You can answer the paragraphs of the list in the order you see fit.
7. Choose one alternative from among the five alternatives.
8. The answer is by putting a sign (✓) in front of the paragraph and under the alternative that represents your response towards the paragraph.

Here is an example of how to answer:

Answer alternatives					Paragraph	Paragraph number
never	Scarcely	sometimes	mostly	always		
			✓		I know how to solve problems with my .technical applications	1

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never	Scarcely	sometimes	mostly	always	paragraphs	No
					The ability of the research subject teacher to teach scientific research classes according to the theoretical foundations of the curriculum	1
					During the lecture, the scientific research teacher uses teaching methods such as (cooperative learning, multiple intelligence strategy, and inquiry-based .(explanation	2
					The teacher of the scientific different research subject uses ,) measurement tools such as	3

PEDAGOGICAL CONTENT KNOWLEDGE (PCK) AND ITS IMPACT ON THE SCIENTIFIC KNOWLEDGE OF SCIENTIFIC RESEARCH FOR MASTER'S STUDENTS IN SOME FACULTIES OF PHYSICAL EDUCATION AND SPORTS SCIENCES

					multiple choice , true and false (question, and open questions .during the explanation	
					Scientific research teacher The ability to make students research . topics in scientific research	4
					The teacher of scientific research is familiar with the difficulties of a subject that students may face	5
					Research subject teacher The ability to overcome any misconceptions that students have regarding scientific research topics	6
					Research Subject Teacher The ability to help students relate a research topic to other topics or concepts	7
					The teacher has the ability to explain the contents of scientific . research	8
					The teacher of the scientific ,research subject helps the students and the maturity of their ideas	9
					Research subject teacher The ability ,to identify educational strategies methods and techniques appropriate to the subject of scientific research	10
					Research subject teacher The ability to identify learning difficulties that students may encounter in relation to scientific research topics	11
					The teacher of the scientific research subject uses many different ,learning styles for the students which help in improving the method of learning the scientific .research subject	12
					The teacher uses scientific research strategies that combine research content and teaching methods	13