The Extent to Which Middle School Science Teachers Possess Active Open-Minded Thinking Skills

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Abstract

The goal of the current research to get to know Building an observation card and finding the criteria (grades and levels) for the observation card for science teachers at the intermediate stage. In order to achieve the goal of the research, the researcher used the descriptive analytical approach, following the following steps: Building an observation card for active open-minded thinking skills to measure the extent to which science teachers possess in the intermediate stage in the light of analysis indicators, and then presenting them to a group of experts and specialized arbitrators to achieve the apparent validity of the observation card. The clarity of the paragraphs of the observation card and its relevance to the teachers' scientific levels, and calculating the coefficient of discrimination and difficulty in order to apply the observation card to the exploratory sample consisting of (6) teachers of science teachers, then the researcher applied the observation card to the basic research sample consisting of (26) teachers in the classroom The second of the year (2021-2022), who were deliberately selected from the schools of Al-Rifai district, and the results showed using the statistical bag for science (SPSS-V23) and the (Microsoft excel) program, as well as the following frequencies and percentages: Science teachers at the intermediate stage possessed skills Active open thinking

In light of the research results, the researcher came up with a set of recommendations:

1- Recommending teachers in general and science teachers in particular to work on developing themselves by continuing to review modern scientific books for educational curricula and beyond, so that they can keep pace with scientific development and thus benefit their students.

2 - Holding scientific seminars for science teachers on the skills of open and active thinking and how to develop them for their students.

The researcher made some suggestions, including:

Conducting a study to find out the extent to which physics teachers of the preparatory stage possess the skills of open and active thinking, taking into account the differences between males and females.

Keywords*:* Teacher, Science, Thinking, Extroverted, Active

Introduction

It is important for science teachers to have open and active thinking skills. Because he It represents an important dimension in the lives of students, as it is of great importance in

immunizing them against the rapid changes that occur around them, as students are exposed to different types of information they receive from various sources, and therefore the role of the teacher here is to help them analyze and interpret the conclusion. For this information, some of which may be coherent and some of it contradictory, and therefore that the teacher's possession of the skills of open and active thinking is considered It is very necessary to raise the level of knowledge of students. (Al-Moussawi, 2011: 120) Educators unanimously agree that the teacher is the main factor in the educational process and the best curricula, activities, methods, analysis and conclusion can not achieve its goals without the presence of a good and effective teacher with good teaching skills, and he is an essential pillar in the educational process. (Salama et al., 2009: 23) Therefore, the researcher believes that it is necessary to know the open-active thinking skills of middle school science teachers and the extent to which they possess these skills to ensure that students acquire them. The problem of the current study can be summarized in the following question:

To what extent do middle school science teachers have the skills of open and active thinking?

Research importance

Here, we find that active open-minded thinking is of particular importance at the present time, as it has been emphasized by modern theories in learning and teaching, which indicated the need for students to learn Skills that enable them to take control of their life affairs, and skills related to developing their ways of obtaining and processing knowledge and being open to the future. (Mohamed Hamad, Omar, 2019)

of students. The teacher has a great influence on his students ; Because it is the essential element in the process of bringing up students as doctors, engineers, lawyers, businessmen and other groups of society, and their backgrounds, knowledge, skills and behavior are greatly affected by the behavior of their teachers. The teacher is an important element in the educational process. (Al-Mufarrej et al., 2007: 11-12)

Research Objectives:

The research aims to:-

Building and applying a note card for middle school science teachers.

Finding criteria (grades and levels) for the observation card for science teachers at the intermediate stage.

Research Limits:

The search will be limited to the following:

Human limits: science teachers for the intermediate stage who are affiliated with the Directorate of Education of DhiQar (Al-Rifai District)

Spatial boundaries: middle schools affiliated to the Directorate of Education in DhiQar (Al-Rifai Education Department).

Time limits: The study was conducted in the academic year 2021-2022 AD

Definition terms

(Active open thinking) Arafa

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(Mahmoud and Aziz, 2019) " Students ' motivation towards effective research, the validity of their ideas and beliefs, and the willingness to change if required. " (Mahmoud and Aziz, 495: 2019)

Methodology

First, the research method

First: Curriculum of Research

The researcher adopted the descriptive-analytical approach, and he defined it:

(Melhem, 2002) as "a systematic objective method that describes in a quantitative, regular and accurate the form and content of written or audio material for any society." (Melhem, 2002: 371)

Second, the research community

The research community is defined as "the community that wishes to generalize the research results to it."

(Atwan and Matar, 2018: 139)

The current research includes a basic field, which is to identify the extent to which science teachers in the middle stage possess the skills of open and active thinking:

The community of teachers (teachers of science for the first and second intermediate grades), and their number (the sample of teachers is 67) teachers.

Third: the research sample

The researcher deliberately selected the research sample from the research community due to its suitability to the method of selecting the sample (the sample that was chosen freely on the basis that it achieves the purposes of the study (Al-Manzel and Ayesh, 2005: 20), and they are the teachers of the Al-Rifai district, whose number is (67) teachers and as follows:

1 - The construction sample, which numbered (35) teachers, constituted a percentage of (52.23%).

2 - The application sample, which numbered (26) teachers, constituted a percentage of (38.80%).

3 - The pilot experiment sample, which numbered (6) teachers, constituted a percentage of (8.95%).

Fourth: the search tool

The research tool is considered one of the basic elements in scientific research in general, as it is not possible to complete the research without using one of the scientific research tools, and the tools differ according to the different objectives and questions of the research. (Abu Samra and Al-Titi, 2020:81)

For this reason, the researcher built a research tool to achieve the goal of the research: to build a note card to measure teachers' open and active thinking skills.

Note card

The research aims to find out the extent to which teachers possess the skills of open and active thinking. This prompted the researcher to use the note card

Define the paragraphs of the note

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For the purpose of determining the notes card items for the research, the researcher reviewed the research and instructions of the educational literature and reviewed many researches in this field, and in light of this review, the skills of the observation card and the paragraphs of each skill were identified. As a tool to determine the extent to which teachers possess the skills of active open-minded thinking, the researcher prepared a note card consisting of (5) skills, namely: (conclusion, judgment, flexibility, opposing alternatives, discovering something new).

Analyze the paragraphs of the note card

The process of analyzing the paragraphs of educational tests and standards (note card) is one of the important and essential steps for the purpose of verifying that the measure performs the purpose for which it was designed (Allam, 2000: 51). The paragraphs of the note card were presented to the arbitrators and their opinions were taken to modify or delete some paragraphs. Paragraphs of the skills of the card were excluded The Observer, and the following is a table showing the skills of the Observer Card.

Paragraph validity:

After preparing the paragraphs of the note card, the researcher did the following:

1- The observation card, in its initial form, was presented to a group of arbitrators with experience and expertise in the field of teaching methods, measurement, evaluation and psychology, in order to identify the validity of the paragraphs and their suitability for measuring what they were designed for, as well as evaluating and amending the paragraphs and judging them in terms of wording and accuracy in The content, as each one was asked to give his comments about the validity of the formulation of the paragraphs, their content and integrity, the main skills and the link of each position with the skill it follows, as well as the reality of the situation and its representation of the characteristic it measures, as well as expressing their opinion about the direction of the paragraphs in terms of being positive, with their observations and suggestions about the card. The observation in general, and about the use of the triple scale of the note card, as the process of answering the arbitrators by placing a mark (√) to the left of the statement to determine the validity of the paragraphs or not.

2- card Observation, the number of skills before modification was (5) skills after being presented to the experts, and the final result was (5) skills, which included (44) paragraphs before modification and after making the modification, the total number of paragraphs of the observation card became (38) paragraphs, as (6) paragraphs of my agencies were deleted:

(5) Paragraphs of the first skill, (11, 14, 20) clauses of the second skill, and (25, 29) clauses of the third skill.

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Table (1)

Percentage, significance level, number of agreeing experts, and Kayi score calculated for the experts' answers to the paragraphs of the note card

	argaraP	srotartibra fo rebmun				auqs		
no						41.0	0.	
							0.	
						37.3	0.	
							,0	
						41.0	0.	
							0.	
						37.3	0.	
							0.	
							0.	
s								
							0.	
							0.	
						30.4	0.	
							0.	
							0.	
	18	45	44	1	97.77%	41.0	0.	noitcnuf

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						8	01	
						27.2	0.	
						41.0	0.	
						37.3	0.	
						27.2	0.	
							0.	
yt						41.0	0.	
							0.	
						21.3	0.	
						37.3	0.	
							0.	
						37.3	0.	
						41.0	0.	
						27.2	0.	
							0.	
						41.0	0.	
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revocsiD							0.	

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wen g						27.2	0.	
						37.3	0.	
						41.0	0.	
							0.	
							0.	
						27.2	0.	

exploratory experience

"It is a survey of the surrounding circumstances in the phenomenon that the researcher wants to study" (Al-Shawk and Fathi, 1989: 156), and "it is considered a practical training for the researcher to find out the negatives and positives that he encounters during the tests to treat them" (Al-Mandalawi, 1989: 156). The observation card is ready for application. The researcher conducted the exploratory experiment before the final application of the research in an appropriate time, through the experiment of the observation card on the sample of the exploratory experiment consisting of (6) teachers of the observation card from the members of the research sample on 28/2/2022 Monday to 3/24/2022 Wednesday, for the purpose of creating the reasons for success when applying the main test to the research sample for the purpose of ensuring that the sample understands the paragraphs and in order to avoid any errors or difficulty when applying during the main test of the research, the researcher has done several things, namely:

- Clarify the answer method for singling the sample.
- Giving the opportunity to individualize the sample to inquire.
- Giving enough time to answer, and the researcher found that the paragraphs are appropriate, and the average time taken to answer ranged between (20-25) minutes. Note card

Statistical analysis of the paragraphs of the note card:

The objective of statistically analyzing the items of the observation card is to improve the quality of the test by discovering the weakness of the items and then working on reformulating them or excluding them if they are not valid." Phrase analysis is defined as "the study that depends on the logical, statistical and empirical analysis of the test units for the purpose of knowing their properties and deleting the items." Or modify, replace or rearrange. in order to arrive at a test that is consistent and honest in length and difficulty."

(Ahmed, 1987: 43)

There are many methods for analyzing phrases, and the researcher relied for analysis on the method of extremist groups and internal consistency.

Discriminating power of the note card:

The discriminatory power of the phrase means the ability of the phrase to distinguish between individuals who are distinguished in the trait measured by the questionnaire and individuals who are weak in that trait (Eble). There is no doubt that a questionnaire that consists of good statements is strong, as the quality of the questionnaire depends on the quality of its component parts, which are the phrases and the ability to distinguish between the weak and the superior, which is the most important indication describing the situation regarding the questionnaire statements. (Habib, 1994: 11)

For the purpose of calculating the discrimination of expressions, the researcher followed the following steps for the note card according to the Hersey Blanchard model:

The note cards were corrected and the total score for each note card was calculated.

The scores obtained by the sample members were arranged in descending order for each note card.

He took (27%) of the observation cards of the higher grades, as well as (27%) of the observation cards of the lower grades. That the selection of the upper and lower (27%) percentage is an acceptable percentage for comparison between two different groups of the total group (Al-Zoba'i et al., 1980: 109), and in light of that, the number of observation cards with the highest degrees was (7) note cards, as well as the minimum, bringing the total of observation cards Taken (14) note card, This procedure was followed on the basis that this ratio provides us with two groups with the maximum possible differentiation in size and distributes a distribution close to the average distribution, thus obtaining the best estimate of the discriminating power.

note card

A (T-test) was conducted between the arithmetic means of the two peripheral groups, a number corresponding to each group a form in a note card, and the results shown in Table (2) were obtained.

table (2)
The value (discrimination coefficient) calculated for the paragraphs of the note card

					detaluclaC eulav)t(	noitacidnI level
1	2.920	0.274	1.160	0.370	2.701	larom
3	2.900	0.303	1.040	0.431	2.226	larom

10	2.940	0.239	1.140	0.350	2.996	larom

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43	1,698	0,680	1,452	0,688	2,177	larom

From Table (2), we find that paragraphs (5, 11, 14, 20, 25, 29) were excluded, and the note card settled on (38) paragraphs.

Internal consistency coefficient:

The discriminatory power of the phrases does not determine the extent of their homogeneity in measuring the phenomenon to be measured. This method shows us the extent of the homogeneity of the phrases, as there may be similar phrases, but they measure different dimensions, so the internal consistency coefficient is used to achieve this purpose and many studies have justified its use of this method because it has the advantage It has many advantages

It provides us (measure) homogeneous in its expressions.

The discriminative power of a statement is the same as the discriminative power of a note card.

The ability to highlight the interdependence between the paragraphs of the note card. (Al-Sara'i and Al-Baldawi, 1987: 96)

Note card:

The researcher used the correlation coefficient (Pearson) between the scores of the sample members on each phrase and their scores on the questionnaire as a whole by means of the statistical bag (spss) and Table (3) shows us that.

Table (3)
Note card internal consistency coefficient

T	noitalerroc	noitacidnI level	T	noitalerroc	noitacidnI level
1	.382(**)	0.000	2	.461(**)	0.000
2	.456(**)	0.000	2	.546(**)	0.000
			2		
			2		
8	.599(**)	0.000	3	.539(**)	0.000

			0		
			3		
			3		
			3		
			3		
15t			3		
			3		
			3		
			4		
			4		
			4		

Indicators of honesty and objective stability:

Note card validity:

The concept of honesty is one of the most important basic concepts in the axis of tests and measurement. The validity of the test is defined as "the degree to which the test or resolution measures the thing to be measured " (Farhat, 2001: 67), and honesty is an important concept in the measurement axis and is a guide if the test measures The characteristic or phenomenon to be measured, and the researcher sought to verify the validity of the observation card through:

Arbitrators' veracity:

This honesty is calculated after presenting it to a number of specialists and experts in the axis on which the test is being conducted. A group of experts to validate its validity and estimate the extent to which each statement measure the components of each skill, and thus

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the paragraphs that obtained expert approval were accepted and the invalid paragraphs were deleted.

Construction veracity:

"Construction validity is one of the most suitable types of validity for building scales, because it depends on empirical verification of the extent to which the degrees of expressions match the characteristic or concept to be measured" (Owais and Al-Hilali, 55: 1997), and it is also known as the validity of the purposeful formation, and it expresses the degree to which the tool is measured. The accuracy of the theoretical structure or feature that it was designed to measure (Al-Awadi, 2020: 70)

extreme groups method, where it was reached by distinguishing the paragraphs with the observation card. two extreme group style,

The internal validity of the test:

The researcher relied on this method (because it has the advantage that it provides us with a homogeneous questionnaire so that each phrase measures the dimension measured by the questionnaire as a whole, and it has the ability to highlight the interrelationship between the positions of the questionnaire) (Al-Samarrai and Al-Baldawi, 1987: 96). And the researcher achieved this kind of honesty, by extracting the internal consistency coefficient of the note card as shown in Table (3).

persistence:

Stability is one of the basic elements in preparing tests and relying on their results, and it means "the stability of the results when re-applying the test to individuals and maintaining the true variance of the test" (Al-Nimr, 2008: 77), "that is, the test or resolution that is characterized by stability is the one that gives the same results if What has been repeated to the individuals themselves and in the same circumstances" (Assaad, 2007: 22), and stability is one of the characteristics of a good scale because it affects the reasons for the consistency of the scale's paragraphs in measuring what the scale is supposed to measure with an acceptable degree of accuracy (Al Kubaisi, 2010: 341). There are several methods by which the reliability coefficient can be extracted, and the researcher has chosen two methods, including:

Halftone method:

The note card that included (38) paragraphs, the Pearson simple correlation coefficient was calculated, which reached (0.735) for its resolution, but this value represents the stability coefficient of half of the test, so the value of the reliability coefficient must be corrected in order for the test as a whole, so the researcher used the Spearman-Brown equation in order to correct The correlation coefficient and thus the stability of the observation card became (0.931), and thus the observation card can be adopted.

Alpha Cronbach method:

This method refers to calculating the correlations between the scores of all the items of the scale, given that the item is a self-contained scale, as it is an indicator of the consistency of the individual's scores, i.e. the homogeneity between the items of the scale (Oudah, 2000: 254), and given that it is used in any kind of Types of objective and essay questions, as stability was extracted in this way by applying (Cornbach's equation) to the members of the

construction sample of (35) using the statistical bag (SPSS), as it was found that the value of the stability coefficient of the observation card is (0.89), which is a high stability indicator., 2004: 240 - 248)

Objectivity:

Objectivity is that the test is not affected by the change of arbitrators, and that the test gives the same results regardless of the meaning of the test. The good, and it means freedom from fanaticism and not introducing personal factors "and describing the capabilities of the individual as they actually exist, not as we want them" (Ibrahim, 1999:17) "It is the extent to which the arbitrator or examiner is liberated from subjective factors such as bias, and this is done by determining the degree of agreement of the rulers or Examiners so that the arbitrator is independent. In the mathematical axis, the instructions for the application of the test (the questionnaire) must be clarified in terms of its procedures, administration, and recording of results. (Al-Samarrai and Al-Baldawi, 1987: 102)

Fifth: Statistical Means

In light of the nature of the research, the researcher used different statistical methods through the Statistical Package for Social Sciences (SPSS V 23) and Microsoft excel) in addressing these methods:

Chi Square To extract the compatibility ratio

Difficulty Factor Equation _ _

The Discrimination Power equation was used to calculate the discrimination power for the paragraphs of the note card. (Return, 1999: 288-290)

equation Alpha - Cronbag (Discrimination power) I used to calculate stability Card Note (Assadi and sonds, 2015: 213-215)

T- test equivalency) (Al-Zamili, 2009: 264)

Presentation and discussion of the results:

This chapter includes a presentation of the researcher's findings, their interpretation, and discussion according to its objectives, as follows:

View card results Observation and interpretation of the research sample:

After the researcher reached the results by applying the research tool (observation card) to the study sample, the data was collected and analyzed statistically and to achieve the research objective of finding the standard scores for the observation card for teachers by obtaining the raw data as (requires converting the raw scores into standard degrees, which It is a means to determine the relative state of the raw scores, and therefore these scores can be interpreted and their results evaluated (Allawi, 1988: 179). Therefore, the researcher presented the table (4).

Table (4)

shows the arithmetic mean, standard deviation, standard error, and the highest and lowest value of the teacher's observation card that was applied to the research sample.

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Note card   Degree **88,33 12,41 40 100 67**

We note from table (8) The results of the observation card reach its mean (88,33), standard deviation (12,41), standard error (40), the highest value (100) and the lowest value (67). After extracting the results in Table (5), the standard score was extracted using the partial and T-degree method (value - arithmetic mean / standard deviation x 10 + 50). (Naji and Ahmed, 1987: 274)

Table (5)

Shows the modified standard scores for the note card

sedarg eht						
T	war	edacaf	T	T	war	edacaf	T
1	67	-1,71	32,81	20	86	-0.18	48,12
2	68	-1,63	33,61	21	87	-0,10	48,92
3	69	-1,55	34,41	22	88	-0.02	49,73
4	70	-1,47	35,22	23	89	0.05	50,3
5	71	-1,39	36,03	24	90	0.13	51,2
6	72	-1,31	36,84	25	91	0.21	52.1
7	73	-1,23	37,64	26	92	0.29	52,9
8	74	-1,15	38,45	27	93	0.37	53,7
9	75	-1,07	39,25	28	94	0,45	54.5
10	76	-0.99	40,06	29	95	0.53	55,3
11	77	-0.91	40,87	30	96	0.61	56.1
12	78	-0.83	41,67	31	97	0,69	56,9
13	79	-0.75	42,48	32	98	0,77	57,7
14	80	-0.67	43,28	33	99	0.85	58,5
15t							
16	82	-0.51	44,89	35	101	1,02	60,2
17	83	-0.42	45,70	36	102	1,10	61
18	84	-0.34	46,51	37	103	1.18	61.8
19	85	-0.26	47,31	38	104	1,26	62,6

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Table (6)

It shows the standard grades and the percentages assigned to them in the normal distribution curve, raw grades, standard grades, the number of teachers, and the modified percentages for the observation card.

ysuol	67-77	32,81-40.87	2	7.69%
egarevA	78-87	41.67-48.92	8	30.69%

It is clear from the previous table that the level (weak), the raw scores ranged between (67-77), and when they were treated statistically, they matched the standard scores (32.81-40.87), where the number of teachers who fell at this level was (2) with a percentage of (7%). 69) As for the level (medium), the raw scores ranged between (78-87), and when they were statistically processed, the standard scores matched (41.67-48.92), where the number of teachers who fell at this level was (8) and by a percentage (30%, 69) As for the level (good), the raw scores ranged between (88 and above), and when they were statistically processed, they matched the standard scores (49.73 - or more), as the number of teachers who fell at this level reached (16) and with a percentage of (61.53%). The researcher concluded that the teachers' application of the observation card paragraphs had the skills of open and active thinking.

Third: conclusions

Through the results of the research, the researcher reached the following conclusions: The science teachers of the intermediate stage possess the skills of open and active thinking.

Fourth: recommendations

In light of the findings, the researcher recommends the following:

1- 1 - Recommending teachers in general and science teachers in particular to work on developing themselves by continuing to review modern scientific books for educational curricula and beyond, so that they can keep pace with scientific development and thus benefit their students.

2- 2 - Holding scientific seminars for science teachers on the skills of open and active thinking and how to develop them for their students.

Fifthly: suggestions

To complement the research, the researcher suggests conducting a study:

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- Conducting a study to identify the possession of physics teachers in the preparatory stage of active open thinking skills, taking into account the differences between the sexes (males and females).

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