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Analyzing Student's Book of Sciences of Intermediate Stage in Light of Reflective Thinking Skills

Abstract

The research aimed to analyze the Sciences books of students for the first and second intermediate grades in light of reflective thinking skills. The number of analyzed pages in the four parts of books was (455) pages distributed over (30) chapters and (14) units, with excepting the introduction of the book and the titles of the units. The researchers prepared the research tool that included five skills: (Reflecting and observation - detecting fallacies - reaching conclusions - giving Reasonable interpretations - putting proposed solutions), with (19) sub indicators, the tool was presented to a number of arbitrators to ensure its validity and reliability, the important results were: Most of the reflective thinking skills are included in the Sciences books for the first and second grade, some skills are poorly, others are well and there is no equitable balance and distribution, the results Researcher put some recommendations and suggestions.

Keywords: Analyzing, Reflective, Thinking, Skills, Sciences.

Introduction

The Statement of the problem: It is known that knowledge and development can only be obtained through following the scientific method based on the correct scientific thinking using thinking skills to reach to solve problems facing our lives, and the reflective thinking is one of the patterns of thinking that depends on how to confront problems, perceive relationships and benefit from information in strengthening a destination Looking at and then the conclusions to finally the solution, and as the materials of science at the various academic levels depend on the scientific method in imposing assumptions and reaching the proposed solutions, as they work on developing patterns of thinking, including reflective thinking, then this research try to verify the reflective thinking and its skills are included in Sciences books for the intermediate stage in Iraq due to the importance of this type of thinking, as many educational studies indicated to its importance, as a study of

(Al-Hudaibah and Ambosa'idi, 2015) And a study of (Al-Shehri, 2017) and a study of (Abu Al-Sa'ud, 2018). The student's book of Sciences were changed and developed by the Ministry of Education, then an attempt to determine the strengths and weaknesses points should be performed by analyzing them for modernization and keeping up with the scientific stakes, including the reflective thinking skills in them.

Hence, the problem of this research can be summarized in answering the following question: What are reflective thinking skills included in the Sciences student's books of intermediate stage?

The Importance of the Research

The importance of this research can be summarized in the following:

The current research represents an addition in the field of studying the reflective thinking, as it may motivate other researchers to analyze the

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content of other subjects and different levels of study.

May motivate those who prepare curricula in Iraq to focus on reflective thinking and its skills, and the necessity of including it in the various subjects.

Providing a list of reflective thinking skills that benefit researchers and teachers in developing students in light of these skills.

The Research Aim

This research aims to identify the level of including the reflective thinking skills in Sciences student's books of intermediate stage.

The Research Limits

The search was limited to the following:

- Sciences student's books for the intermediate stage, which include: the Sciences book for the first grade in two parts (first and second), the book of second intermediate grade in two parts (1 and 2), for the academic year 2018-2019.
- Analyzing the scientific subject in the mentioned books, excluding the introductions of the academic units and their reviews from the analysis.

Defining the Terms

Reflective Thinking Skills

Defined by (Abu Al-Sa'ud, 2018): as the chain of skills which the student follow what he sees, hears or uses to reach a specific problem and gives its Reasonable interpretations, develops suggested solutions and reveal fallacies to solve the problem by using his previous knowledge. (Abu Al Sa'ud, 2018).

The researchers define it as: the five skills (reflect and observation - detecting fallacies - reaching conclusions - giving Reasonable explanations - putting proposed solutions) that are mentioned in the list prepared for conducting the process of analyzing the content of Sciences books for the intermediate stage in light of reflective thinking skills.

Literature Review

Reflection Thinking

Many educators have reflective thinking in their writings, as (Binet, 1929), (James, 1931) and (Dewey, 1933), but it disappeared from studies during the flourishing of behavioral school, until the early eighties of the last century when (Schon, 1983) wrote about the importance of reflective thinking and taking analytical and

critical thinking to the use of the term (reflective) (Afoon and Abdel-Sahib, 2012).

Several definitions of reflective thinking have been mentioned, like:

(Al-Atoom, Al-Jarrah and Bishara, 2009) Defined it as the thinking in which the individual contemplates the situation in front of him, and analyzes it to its components and draws the necessary plans to understand it in order to reach the results required by the situation and evaluate the results in the light of the plans laid down.

(Al-Awfi and Al-Jumaidi, 2010) Define it as the thinking in which the learner transcends the level of simple rules and rules and the apparent relationships between information and focuses on forming the true meaning by discovering similarities and differences.

It is clear from the presentation of the previous definitions that reflective thinking is characterized by the following:

It is an intended and targeted thinking in which the individual contemplates a problem or challenge that he or she faces.

Mental activity that includes a specific goal and steps leading to a solution to the problem.

Stages of Reflective Thinking

There are four stages for reflective thinking:

1. The presence of a problem situation.
2. Defining the problem.
3. Create hypotheses.
4. Choose the best solution. (Al-Afoon and Abdel-Sahib, 2012).

Reflective Thinking Skills

Reflective thinking skills are represented by five mental skills, as follows:

1. Reflecting and observation: It means the ability to display aspects of the problem and learn about its components, whether it is through the problem or through a drawing or a form that shows its components, so that relationships can be discovered and seen visually.
2. Detecting fallacies: It is the ability to identify gaps in the problem, by identifying incorrect or illogical relationships.
3. Reaching conclusions: It means reaching a logical relationship through seeing the content of the problem and reaching appropriate results.
4. Giving reasonable explanations: It is the ability to give a logical meaning to the results or the linking relationships, and this meaning may be based on

- previous information or on the nature and characteristics of the problem.
- Putting proposed solutions: It is the ability to develop logical steps to solve the problem at hand, and these steps are based on expected mental scenarios of the proposed problem. (Afana and Lulu, 2002).

The current research is consistent with these five skills, and adopted in building a content analysis tool.

the availability of reflective thinking skills in Sciences books for the first and second intermediate grades.

Determining Data Sources

The research included the Sciences book - for the first intermediate grade (part1 and part2), the third edition, and the second intermediate grade book (part1 and part2), the first edition of the academic year 2018-2019, and as shown in tables (1, 2, 3, 4).

The Research Procedures

The Research Methodology

The two researchers used the descriptive analytical approach (content analysis) to identify

Table 1.

Units, chapters and number of pages in the science book for the first grade – part 1

Unit	Chapter	Chapter Name	Number of Pages
One	1	Characteristics of the Chemical Compounds	20
	2	Atoms, elements, and compounds	24
Two	3	Composition and Classes of Elements	20
	4	Chemical reactions and expression	23
Three	5	Power and pressure	22
	6	Heat and stretching	23
3			132

Table 2.

units, chapters and number of pages in the science book for the first grade – part2

Unit	Chapter	Chapter Name	Number of Pages
One	1	Microscopes	13
	2	Scientists efforts to develop of biology	10
Two	3	cell	11
	4	Cellular division	13
	5	Regulating the action of Organisms bodies	11
Three	6	The concept of genetics	13
	7	Genetics applications	12
3			83

Table 3.

Units, chapters and number of pages of Science book for the second grade – part1

Unit	Chapter	Chapter Name	Number of Pages
One	1	Chemical elements and bonding	14
	2	Chemical compounds	11
Two	3	Chemical formulas and reactions	13
	4	Solutions	28
Three	5	The science of taxonomy	11
	6	How organisms are classified	11
Four	7	Simple organisms	12
	8	Kingdom of plants	14
Five	9	The animal kingdom	13
	10	The environment and & components	12
	11	Balance in the ecosystem	20
5			159

Table 4.

Units, chapters and number of pages of Science book for the second grade – part2

Unit	Chapter	Chapter Name	Number of Pages
One	1	Motion and Force	17
	2	Motion laws	11
Two	3	Work, Power and Energy	10
	4	Work and Machines	11
Three	5	Wave motion and Sound	13
	6	Light	19
3			81

It is clear from the tables that the number of analyzed pages is (455) pages divided into (30) chapters and (14) units, with the exception of the introduction to the book and the titles of the study units.

Research Tool

To achieve the research aim, the researchers prepared a list of the skills of reflective thinking that should be included in the Sciences books of the first and second intermediate grades, its preparation was as the following:

- A review of past studies dealing with the topic of reflective thinking skills and related theoretical literature. The research tool included five skills: (reflecting and observation - detecting fallacies - reaching conclusions - giving reasonable explanations - putting proposed solutions), and was presented to a group of arbitrators in the curricula and teaching methods, and after the researchers took notes, the tool became in its final form contained five skills divided to (19) sub-indicators.

Analysis Steps

The researchers relied on the explicit idea of being the most used unit of analysis, which is the sentence or its likeness in which it is explicitly indicated directly to the desire for something or the desire for it. It is a simple or a complex sentence that is directly or explicitly referred to as a desired or undesirable aim, criterion, or judgment (Al-Salman & Al-Haiti, 1987,19). Whereas the census unit (repetition) as a census unit to monitor the statistics of phenomena that express a specific idea, its significance and its content coincided with a paragraph of the paragraphs of the standard

used and converted into percentages for the purpose of analysis.

Reliability of analysis: Reliability was calculated in two ways:

1. Agreement by time: repeating the analysis after (21) days.
2. Agreement between analysts, this was confirmed by presenting a model from the analyzed material (20%) of the total content of the book for them, and by applying Holsti equation (1969) for both types of reliability which states.

$$PA_0 = 2A / (N1 + N2)$$

A= Number of agreement times in the two analyzes, $N1 + N2$ = the sum of the number of categories of analysis in the two analysis times.

The reliability coefficients were as follows:

(a) - Agreement by time 96% (b) Agreement between analysts 92%, and thus the reliability coefficients are good, as he sees (Odeh, 1999) that tests if their coefficient of reliability (0.60) and above are good (Odeh, 1999, 367).

Determining the criterion percentage to compare the results of the analysis: The two researchers relied on the percentage (70%) as a possible percentage to compare the results of the analysis, by relying on the arbitrators agreement.

Statistical Methods

1. Holsti Equation
2. Frequencies
3. The percentage

View and Discussion of Results

The number of the analyzed pages reached (455) pages. The results of the analysis of Science books for the first and second intermediate grades were as follows:

Table 5.

Frequencies and percentages of reflective thinking skills in Sciences book / part1 of the intermediate first grade.

Skill	Chapters						Total	Percentage	Criterion percent age *	achieved
	1	2	3	4	5	6				
Reflect and observation	2	2	5	2	4	1	16	21%	%14	Yes
Detecting fallacies	2	1	2	2	1	2	10	13%	%14	No
Reach conclusions	5	2	1	2	4	1	15	19%	%14	Yes
Giving reasonable explanations	4	2	4	3	2	2	17	22%	%14	Yes
putting proposed solutions	6	2	4	4	2	1	19	25%	%14	Yes
Total	19	9	16	13	13	7	77	100%	%70	

- Adopted from Arbitrators as 70% divided on skills number

From Table (5), we note that all skills are achieved in varying proportions except the skill of detect fallacies whose frequency in the chapters of Sciences book of the first intermediate grade – part1 is 13% and is less

than the Criterion percentage of the chapter which is 14%, the skill of putting proposed solutions has achieved The highest percentage (25%) with the number of frequencies (19) followed by the skill of giving reasonable explanations (22%) with the number of frequencies 17.

Table 6.

Frequencies and percentages of reflective thinking skills in Sciences book / part 2 of the intermediate first grade

Skill	Chapters							Total	Percentage	Criterionpercentage *	achieved
	1	2	3	4	5	6	7				
Reflect and observation	4	5	2	3	8	3	3	28	26%	%14	Yes
Detecting fallacies	1	1	1	4	1	2	1	11	10%	%14	No
Reach conclusions	6	1	2	2	3	3	4	21	19%	%14	Yes
Giving reasonable explanations	6	1	5	5	5	4	3	29	27%	%14	Yes
putting proposed solutions	3	2	3	2	3	2	4	19	18%	%14	Yes
Total	20	10	13	16	20	14	15	108	100%	%70	

- Adopted from Arbitrators as 70% divided on skills number

From table (6), we note that all skills are achieved in varying proportions except the skill to detecting fallacies whose frequency in the Sciences book chapters of the first intermediate grade – part2 was 10% less than the criterion

percentage 14%, the skill of giving reasonable explanations had highest percentage (27%) with frequencies of (29), followed by the skill of reflecting and observation with (26%) with frequencies of (28).

Table 7.

Frequencies and percentages of reflective thinking skills in Sciences book / part 1 of the intermediate second grade

Skill	Chapters											Percent age	Criterionperc entage *	achie ved	
	1	2	3	4	5	6	7	8	9	10	11				Tot al
Reflect and observation	4	2	5	1	5	5	6	1	3	4	4	40	18%	%14	Yes
Detecting fallacies	4	6	7	2	8	5	9	2	7	8	9	67	30%	%14	Yes
Reach conclusions	1	2	2	1	1	3	3	1	2	4	5	25	11%	%14	No
Giving reasonable explanations	6	3	2	6	4	7	7	3	7	1	2	48	21%	%14	Yes
putting proposed solutions	4	4	3	4	5	5	4	4	6	4	3	46	20%	%14	Yes
Total	19	17	19	14	22	22	29	11	25	22	23	226	100%	%70	

From table (7), we notice that all skills are achieved in varying proportions except the skill of reach conclusions whose frequency in the Sciences book chapters for the second intermediate grade – part1 is 11%, which is less than the criterion percentage 14%, the skill to

detecting fallacies has been achieved the highest percentage (30%) with frequencies of (67), followed by the skill of giving reasonable explanations (21%) with the number of frequencies 48.

Table 8.

Frequencies and percentages of reflective thinking skills in Sciences book / part1 of the intermediate second grade

Skill	Chapters						Total	Percentage	Criterion percentage	achieved
	1	2	3	4	5	6				
Reflect and observation	5	3	3	2	3	5	21	24%	%14	Yes
Detect fallacies	8	1	5	3	3	6	26	30%	%14	Yes
Reach conclusions	1	2	3	3	2	0	11	12%	%14	No
Giving reasonable explanations	3	2	1	4	3	2	15	17%	%14	Yes
putting proposed solutions	5	2	2	2	2	2	15	17%	%14	Yes
Total	22	10	14	14	13	15	88	100%	%70	

From table (8), we note that all skills are achieved in varying proportions except for the skill to reach conclusions whose frequency in the science book chapters for the second intermediate grade - the second part is 12%, which is less than the criterion percentage for the semester, which is 14%, and the skill to detecting fallacies has been achieved The highest percentage (30%) with the number of frequencies (26), followed by the skill of giving reasonable explanations (24%) with the number of frequencies 21.

The results obtained for Sciences books for the first and second intermediate grades are meet with the study (Al-Shehri, 2017) in the fact that most of the skills were generally included.

Conclusions

In light of the results of the research, the researchers concluded the following:

1. Most of the reflective thinking skills are included in the Sciences books of the first and second intermediate grades.
2. Some skills are poorly included, others are good.
3. There is no equally including of reflective thinking skills in Sciences books of the first and second grades.

Recommendations

In light of the results, the researchers recommend the following:

1. The necessity of re-enriching Sciences books with thinking skills in general and reflective thinking skills in particular.
2. Including questions, issues, and activities that develop reflective thinking skills in Sciences books
3. The necessity of training teachers on reflective thinking skills to develop their students in these skills.

Proposals

In order to complete this research, the researchers suggest the following:

1. Carrying out a similar study about preparatory stage books.
2. Conducting an evaluation study of the Biology, Physics and Chemistry books of the third intermediate grade in light of reflective thinking skills.
3. Conducting an evaluation study of sciences books of the elementary stage according to the reflective thinking skills.

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