Investigating the Mental Abilities Inclusion in the Mathematics Book for Sixth Grade of Primary School

By

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Abstract

The objective of the current research is to determine the percentages of mental abilities of the Guilford model in the content of the mathematics textbook for the sixth grade of primary school. The content analysis research was adopted to analyze content of the mathematics textbook for the sixth grade of primary school set by the Iraqi Ministry of Education in the academic year (2021-2022). A list of mental abilities was prepared according to the Guilford model to analyze the content of the mathematics book for the sixth grade of primary school, and to determine their proportions in the book after being validated and checked their stability. Results of the analysis showed that there is a discrepancy in the percentages and frequencies of mental abilities and at the level of the mathematics book for the sixth grade as a whole. The focus of the math book focused on knowledge thinking abilities which occupied the first rank with percentage of (29.24%) followed by memory thinking abilities which form 25.72%. Convergence thinking abilities came in the third rank with a percentage of 25.37%, followed by the evaluative thinking abilities which form 18.88% of the mental abilities. Finally divergent thinking abilities constructed just 0.80% of the mental abilities.

Keywords: Content analysis, Guilford model, mathematics textbook, mental abilities, sixth grade.

Introduction

Some scientific conferences, including the eleventh conference held in Baghdad in (2005) stressed the necessity to continue developing the school curricula, to include content, teaching methods and strategies, to keep pace with the rapid developments in the educational process (Ministry of Higher Education and Scientific Research, 2005).

The development of any country in the world lies in keeping pace with the scientific and technological development, which is achieved by the continuous development of the content of its curricula. During the period (2013-2019), Iraq witnessed many changes in the content of textbooks, including mathematics books from the first to the sixth grade of primary school, due to their importance in the education process in general and the primary stage in particular. Primary education represents the cornerstone of the stages of the educational ladder. Reviewing a number of previous studies (i.e., Ahmed, 2020; Al-Mehyawy, 2014). The results of such studies showed a decrease in the levels of thinking and mental abilities among primary school students which may be one of the reasons for the textbook. Stemming from the principle of modernization and development in the curricula, the researchers decided to conduct this research. They crystalize the problem of the current research to answer the following question:

What are the mental abilities of the Guilford model included in the content of the sixth grade mathematics textbook?

Research significant

The importance of the research lies in two aspects:

Theoretical importance

1) The importance of mental abilities in the learners' present and future lives, as well as their importance in the individual's professional, social and educational lives
2) The importance of mathematics in education as one of the scientific subjects that enjoys change and development, especially in light of scientific discoveries and technological developments, and its connection with other scientific subjects.
3) The sixth primary grade is an important stage as it constructs the end of the primary stage, and the transition to the intermediate stage, i.e. the transition from the stage of sensory operations to the stage of semi-sensory operations. The sixth grade represents accumulation for basic information required to the students in addition to the knowledge, experiences and skills which develop students' mental abilities to face future challenges.
4) This research, as far as the researchers are concerned, is the first to explore the mental abilities of the Guilford model included in the mathematics book for the sixth grade of primary school.

Applied importance
1) This study provides a list of the mental abilities of the Guilford content analysis model, which may be useful to researchers in analyzing the content of other textbooks and for different educational stages.
2) The results of the present study may draw the attention of the curriculum makers to develop the content of the mathematics book for the sixth grade of primary school on scientific bases, and pay more attention to mental abilities to improve its scientific content in line with modern trends.
3) It may contribute to providing the authors with information that helps in improving the quality of the mathematics book for the sixth grade of primary school.

Research objective
This study aims at determining the percentage of mental abilities of the Guilford model in the content of the sixth grade mathematics textbook.

Literature review

Al-Zaanin (2011) defined the mental abilities of the Guilford model as a group of three-dimensional mental construction, represented in operations, content, and outputs, and the sub-abilities that derive from them. Mental abilities will be procedurally defined as a set of mental abilities contained in the Guilford model of the three-dimensional mental construction. They are 120 mental abilities resulting from the product of multiplying the factors of its three dimensions, content, operations, and outputs, whose proportions and frequencies will be determined in the mathematics book for the sixth grade of primary school according to the analysis card prepared for this purpose. The researchers did not find any previous study on the mental abilities of the Guilford model included in the mathematics

book for the sixth grade of primary school, so studies related to the analysis and evaluation of book questions and exam questions will be addressed according to the Guilford model of mental abilities.

Previous studies

Al-Amrani (1998) conducted a study in Iraq aimed at analyzing the content of the topics of the questions of the chapters of the physics books for the third intermediate and sixth scientific grades, and the questions of general exams, and building models for analysis in the light of mental abilities. The study descriptive approach was adopted, and the research sample consisted of the questions of the chapters of the two physics books for my class (the third intermediate and the sixth scientific) and the questions of the general exams for my class (the third intermediate and the sixth scientific). The researcher prepared a list of mental abilities selected from the Guilford model of mental abilities as well as other abilities that the researcher derived from previous studies. Frequency, percentage and Scott's equation to calculate stability were used. The results showed the following: The minimum mental abilities (knowledge of meaning units) had the largest share of the number of questions It also showed a lack of interest in higher thinking abilities (divergent, convergent, evaluative, and imaginative).

Ashour, (2009) evaluated the ministerial exam questions for chemistry in Iraq for the intermediate and preparatory stages in the light of Gilford's mental abilities and building models for them. The researcher adapted the descriptive approach, and the sample of the study was the questions of chemistry books for the third intermediate grade and the sixth scientific grade. The researcher constructed a list of mental abilities that drawn up from the Guilford model of mental abilities that the chapter questions were supposed to measured. Results showed that the questions of the ministerial exams for the third intermediate and sixth scientific grades focused on cognitive thinking, memory, and evaluative thinking abilities and neglected the convergence and divergence thinking abilities.

Al-Ghalabi (2009) aimed at evaluating the questions of the general ministerial exams for mathematics in the Iraqi preparatory scientific stage, in the light of mental abilities. The descriptive approach was adopted, and the purpose of the study was the questions of the general ministerial exams for the sixth grade, mathematics subject, which numbered 10 model questions. The researcher constructed a list for analysis which included the abilities that the questions are supposed to measure. They were selected from the GMMA. Results showed that the mathematic questions of the general ministerial exams for the sixth scientific grade do not include all mental abilities, and great interest is given to the abilities of convergent thinking and memory, and there is no interest in questions of cognitive, divergent and evaluative thinking.

Aspects of getting benefit from previous studies
1)   They helped in formulating the research problem.
2)   They helped in formulating the research objective and question.
3)   They supported and enriched the theoretical background of the current research.
4)   They helped in choosing the appropriate approach for the current research, which is the content analysis design.
5)   Reviewing the steps and procedures and choosing the appropriate statistical methods.
6)   The results of previous research may be useful in interpreting the results of the current research.
7)   Enriching the current research with references.

Methods

Research design

The method of content analysis was adopted due to its suitability to the nature of the research objective .The current research was limited to mathematics textbook for the sixth grade of primary school, prescribed for sixth grade students from the Iraqi Ministry of Education, for the academic year 2021-2022. The study analyzed of the Guilford model 120 mental abilities of the prescribed textbook.

The research community

The current research community is represented by the mathematics book to be taught by sixth grade students from the Ministry of Education in Iraq, 1st edition, 2020. As for the research sample, it was represented by the research community itself after excluding the following: (book title page, scientific supervisor and expert page, introduction page and content page (Index), provided in each chapter of the book) because it does not represent scientific content, and as shown in Table 1.

Table 1.Description of the chapter titles and number of pages

Chapter	Chapter title	Page number after deletion	Percentage
First	Integers	25	%13.16
Second	Algebraic expressions and equations	21	%11.05
Third	Operations on ordinary fractures and fractional numbers	17	%8.95
Fourth	Operations on decimals	25	13.16%
Fifth	Proportion	21	11.05%
Sixth	Statistics	15	%7.89
Seventh	Parallel lines and circle	23	%12.11
Eighth	Geometrical figures	21	%11.05
Ninth	Measurement	22	%11.58
	Total	190	100 %

Instrument

A list of mental abilities was prepared to be used for achieving the research objectives. They are as follows:

Identifying the instrument objective

The purpose behind preparing the list of mental abilities is to determine the percentage of presenting such abilities in the content of mathematical books of sixth year stage of primary education.

Reviewing previous studies

After reviewing the literature and previous studies, a list of the mental abilities of the Guilford model was not found ready for analyzing the content of the mathematics book. So, the researchers prepared them depending on reviewing the studies of Al-Amrani (1998) and Ashour (2009). The first draft tool. The tool in its initial drafting consisted of 120mental abilities of the Guilford model. They were resulting from the union of the factors of each of the three dimensions of the model (content, mental operations, and outcomes), as follows:

a)   The first dimension (content): It includes 4 factors, namely: (forms, symbols, meanings, behavioral content;
b)   The second dimension (mental processes): It includes 5 factors, namely: (knowledge, memory, convergent thinking, divergent thinking, and evaluative thinking(.
c)   The third dimension (outputs): It includes 6 factors, namely: (units, categories, relationships, systems, transformations, and inclusions).
That is, 4 x 5 x 6 = 120 mental abilities.

Face validity

To check the validity of the instrument, a first draft list of 120 mental abilities was presented to a group of juries specialized in mathematic teaching methodologies and psychology to check the list credibility and connection to the research objective. Juries were asked to provide their opinions on them, whether deleting, modifying what they think necessary. The referee's process led to modify some mental abilities in an agreement rate of 83% to become more precise and objective.

The tool of analysis in its final form

After making the necessary modifications to the list of mental abilities, the tool is now in its final form, ready to start analyzing the content of the sixth-grade mathematics textbook and determining the percentages of mental abilities according to the Guilford model in the book.

Analysis of the content of the sixth grade mathematics book
Analysis procedures

The following procedures were followed before starting the analysis process:

Determining the purpose of the analysis

The analysis aims to determine the percentages of mental abilities of the Guilford model in the content of the mathematics book for the sixth grade of primary school. This book is to be taught to students in the academic year 2021-2022.

Determining the units of analysis

The explicit and implicit idea of the analysis was relied upon, due to its suitability to the nature of the content and to the items of the mental abilities list.

Determine the enumeration unit

Frequency was used as the enumeration unit.

Analysis sample

The analysis sample consisted of the content of the sixth grade mathematics book for the of primary school. It was previously specified in Table 1. The analysis included all chapters of mathematic book (pupil's book). It included exercises for (check, talk, solve, think, problem solving plan, chapter review, class test). The analysis excluded the Teacher's Guide and Exercise books.

Analysis controls

In order for the analysis process to be performed well, there must be controls that monitor this process, and these controls are:

i.   The analysis was carried out in light of the Guilford model mental abilities list after converting them into an analysis card.

ii.   The analysis process included all figures, pictures, tools and tables in the topics of lessons in each chapter, as well as the tests at the end of each lesson, and each chapter.

iii.   The analysis does not include chapter interfaces, index, and book interfaces, as well as the idea of the lessons.

iv.   Taking into account that one item contains a number of sub-items, and also the sub-items contains a number of ideas, and each idea represents an indicator, and is considered a frequency each time.

Analysis steps

The following steps were followed in the analysis process:

i.   Viewing the sixth grade mathematics book for the primary school to get familiarity with its topics and concepts, so that the image becomes clear in the mind.

ii.   Revising each chapter in the book carefully, in order to adjust the analysis.

iii.   Recording the results of the analysis and classifying them in a table to know the results of the analysis process and converting them into frequencies and then into percentages, so that they can be interpreted and discussed later.

Validity of the analysis

A sample was taken from the content analysis sample randomly. The first chapter (integers) was from the content of the mathematics book for the sixth grade of primary school. The analysis was sent to a group of arbitrators and specialists, and their opinions were compatible with the analysis by more than (85%) and this is considered a good percentage to achieve the validity of the analysis.

Reliability of the analysis

The stability of the analysis was verified by following two methods:

The stability of the analysis over time

This was done by repeating the analysis after a period of time of 21 days. The authors compared the results of the first and second analysis. The percentages of agreed upon analysis was used in the two analyses using Holst equation which showed that similarity between the two analyses ranged between (1-0.80; 1-0.87(.

Consistency among analysts

To ensure this type of stability, the researchers called out two other analysts (interrater reliability). They analyzed the content of the first chapter of the sixth-grade mathematics textbook, after providing them with a list of mental abilities of the Guilford model (analysis card). After the completion of the analysis, the stability coefficient ratios were calculated using the Holst equation, and it was found that they ranged between (1-0.80).

Statistical means

The Holst equation was used to calculate the reliability coefficient of the analysis, the frequencies, and the percentage.

Results and discussion

To achieve the research objective represented by identifying the percentage of mental abilities according to Guilford model of mental abilities in the content of mathematics

textbook of six grade in Iraq. After analyzing the book chapters according to the card of mental abilities prepared by the researchers, frequencies and percentages for the inclusion of mental abilities were calculated:

Chapter one

The ability to remember symbol units showed the highest percentage (6.64%), followed by the ability to recognize symbol units by (6.62%), the ability to enumerate symbol units by (6.55%). Then the ability to identify the relationships between symbols scored (6.32%) and the ability to identify symbol transformations amounted (6.02%), followed by the ability to distinguish symbol transformations (5.93%). Likewise, the ability to describe relationships between symbols reached (4.89%), then the ability to name symbol units which amounted (4.68%). Finally, the ability to write relationships between symbols and display symbol transformations reached (4.66%).

Besides, the abilities of knowing units of meanings, behavioral attitudes, categories of figures, categories of meanings, categories of behavioral situations, knowing the relationships between figures, meanings and behavioral situations, knowing transformations of figures, meanings, and attitudes, remembering units of forms, meaning, and behavioral situations, identifying categories of meanings, defining categories of behavioral situations, describing relationships between meanings, behavioral situations and meanings, distinguishing transformations of behavioral situations, clarifying the implications of meanings and behavioral situations, enumerating units of figures, meaning, and unit of behavioral situations, classifying categories of meanings, and behavioral situations, writing relationships between meanings, and behavioral situations, presenting transformations of meanings, behavioral situations, evaluating the implications of meanings, and behavioral attitudes, identifying symbolic units, and behavioral attitudes units, representation of symbolic categories, the use of relationships between symbols, naming of object units, naming of attitudes and units of behaviorism showed a variable rate between (4.50% - 0.05%). The researchers attribute the appearance of such abilities at a varying rate to the lack of focus of the designers and authors of the curricula on examples, topics, and exercises that include the indicator of these abilities.

Similarly, the abilities of recognizing relationship between figures, recognizing the inclusion of figures, symbols, meaning, knowing the implications of behavioral situations, identifying classes of figures, describing relationships between figures, distinguishing transformations of figures, clarifying the inclusions of figures, classifying classes of figures, writing relationships between figures, displaying transformations, displaying transformations of meanings, displaying inclusions of figures, identifying units of figures, defining units of meanings, and behavioral situations, representation of categories of forms, meanings and behavioral situations, the use of relations between forms, meanings, and behavioral situations, extraction of transformations of forms, symbols, meanings and behavioral situations, finding the inclusions of forms, finding symbols, meanings and behavioral situations, summarizing the categories of forms, applying the formulas relationships between forms, interpretation of transformations of forms, extracting the implications of forms and meanings did not appear in the first chapter, i.e., the integers. The researchers justified this finding to the negligence of the curriculum designers on examples and topics which include such mental abilities.

Besides, the abilities of getting knowledge of systems of figures, symbols, meanings, and behavioral attitudes, recognizing systems of figures, symbols, meanings, and behavioral

attitudes, inferencing systems of forms, symbols, meanings, and systems of behavioral attitudes, discovering systems of figures, systems of symbols, systems of meanings, and systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, and systems of behavioral attitudes had not been represented in chapter one and got (0%).

Chapter two

The ability to describe relationships between symbols showed the highest rate (7.12%), followed by the ability to recognize symbol units and relationships between symbols by (6.90%). Besides, the ability to remember symbol units forms (6.72%), and the ability to write relationships between symbols figures (6.70%) of the total mental abilities. Next, came the ability to distinguish symbol transformations by (6.60%), then display symbol conversions by (6.52%), naming symbol units by (5.60%) and applying relationships between symbols by (5.55%). The researchers attributed the appearances of these abilities to the focus of mathematics curriculum designers on examples, topics, and tasks which boost such abilities on the students.

The abilities of getting knowledge of units of forms, units of meanings, and units of behavioral attitudes, knowing categories of forms, categories of meanings, categories of behavioral situations, knowing the relationships between forms, between meanings, between behavioral attitudes, knowing of transformations of forms, transformations of meanings, transformations of behavioral situations, remembering units of forms, units of meaning, and units of behavioral situations, identifying categories of meanings, and categories of behavioral situations, describing relationships between meanings, and between behavioral situations, distinguishing transformations of meanings, and behavioral situations, clarifying implications meanings, and behavioral situations, enumerating units of forms, units of meaning, units of behavioral situations, classifying categories of meanings, categories of behavioral situations, writing relationships between meanings, between behavioral situations, presenting transformations of meanings, presenting transformations of behavioral situations, evaluating implications of meanings, implications of behavioral situations, identifying symbol of units, identifying units of behavioral attitudes, representing classes of symbol, using of relationships between symbols, naming of units of form, and units of behavioral attitudes were included in the textbook with varied percentages between (4.06% - 0.02%).

Besides, the abilities of knowledge of systems of figures, knowledge of systems of symbols, knowledge of systems of meanings, knowledge of systems of behavioral attitudes, recognizing systems of figures, recognizing systems of symbols, recognizing systems of meanings, identifying systems of behavioral attitudes, inferencing systems of figures, inferencing systems of symbols, inference systems of meanings, inferencing systems of behavioral attitudes, discovering systems of figures, discovering systems of symbols, discovering systems of meanings, discovering systems of behavioral attitudes, arranging systems of figures, arranging systems of symbols, arranging systems of meanings, arranging systems of behavioral attitudes represent (0 %) in the mathematics book.

Chapter three

The abilities of symbol units and knowing the relationships between symbols got the highest rate 6.96%, followed by the abilities of remembering symbol units and describing the relationships between symbols with a rate of 6.89%. Then the ability to write relationships

between symbols with a rate of (6.85%), and the ability to know symbol transformations (6.70%). Besides, the ability to enumerate symbol units by (6.59%), followed by the abilities to display symbol transformations and to distinguish symbol transformations by (6.48%), then naming symbol units by (5.89%) and applying relationships between symbols by (5.68%) .

Likewise, the abilities of knowing units of meanings, units of behavioral attitudes, knowing categories of forms, categories of meanings, categories of behavioral attitudes, knowing relationships between forms, relationships between meanings, relationships between behavioral situations, knowing of transformations of forms, transformations of meanings, transformations of attitudes, remembering units of forms, units of meaning, units of behavioral situations, identifying categories of meanings, categories of behavioral situations, describing relationships between meanings, relationships between behavioral situations, distinguishing transformations of meanings, transformations of behavioral situations, clarifying the inclusions of meanings, inclusions of symbols, inclusions of behavioral situations, enumerating the units of forms, units of meanings, units of behavioral situations, classifying categories of symbols, categories of meanings, categories of behavioral situations, writing relationships between meanings, between behavioral situations, displaying transformations of meanings, transformations of behavioral attitudes, evaluating the inclusions of symbols, implications of meanings, implications of behavioral attitudes, identification of symbol units, units of behavioral attitudes, representation of classes of symbols, investigating the relations between symbols, naming the units of forms, and units of behavioral attitudes appeared in varied percentage between (5.78% - 0.04%). The researcher attributed the varied representation of these abilities in the third chapter (Operations on ordinary fractures and fractional numbers).

Moreover, the abilities of knowing the implications of figures, symbols, knowing the meanings, behavioral situations, identifying categories of figures, describing relationships between figures, distinguishing transformations of figures, clarifying the inclusions of figures, classifying categories of figures, writing relationships between figures, displaying transformations of figures, transformations of meanings, displaying the inclusions of forms, defining the units of forms, meanings, and units of behavioral attitudes, the representation of categories of forms, meanings, and behavioral situations, the use of relations between forms, meanings, and behavioral situations, extraction of transformations of figures, symbols, meanings and behavioral situations, finding inclusions of figures, symbols, meanings, and behavioral situations, summarizing categories of figures, applying relationships between figures, interpreting transformations of figures, extracting inclusions of figures and meanings form (0 %) in the third chapter.

In the same vein, the abilities of knowing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, system of symbols, systems of meanings, systems of behavioral attitudes, inferencing systems of figures, systems of symbols systems of meanings, systems of behavioral attitudes, discovering systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes constructed (0%) in chapter three.

Chapter four

The ability of knowing units of symbols got the highest rate (6.66%) in the fourth chapter (operations on decimal fractions), followed by the ability to display symbol

transformation by (6.57%). Then in the third rank came the ability to know symbol transformation by (6.54%); the ability of distinguishing symbol transformation reached (6.48%). Likewise, the ability to know the relationships between symbols amounted (6.41%) and describing the relationships between symbols scored (6.38%), remembering symbol units by (6.32%) and writing relationships between symbols by (6.25%), followed by naming symbol units by (5.47%) and applying the relationships between symbols by (5.35%).

Furthermore, the abilities of knowing units of meanings, units of behavioral attitudes, knowing categories of forms, categories of symbols, categories of meanings, of categories of behavioral situations, knowing the relationships between forms, relationships between meanings, relationships between behavioral situations, knowing the transformations of forms, transformations of meanings, transformations of behavioral situations, remembering units of forms, units of meanings, units of behavioral situations, identifying categories of meanings, categories of behavioral situations, describing relationships between meanings, relationships between behavioral situations, distinguishing transformations of meanings, transformations of behavioral situations, clarifying the implications of meanings, implications of symbols, implications of behavioral situations, enumerating the units of forms, units of meanings, units of behavioral situations, classifying categories of symbols, categories of meanings, categories of behavioral situations, writing the relationships between meanings, between behavioral situations, presenting transformations of meanings transformations of behavioral situations, evaluating the inclusions of symbols, inclusions of meanings, inclusions of behavioral attitudes, defining symbol units, units of behavioral attitudes, representing categories of symbols, using relationships between symbols, naming the units of figures, units of behavioral attitudes were varied in the text book chapter four between (0.02% - 3.39%).

Besides, the abilities of knowing of systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, inferencing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, discovering systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes formed (0%) of the mental abilities in the fourth chapter of the textbook.

Chapter five

The ability to know the relationships between symbols came in the fifth chapter (proportion) with the highest rate (6.35%), followed by the ability to describe the relationships between symbols by (6.29%). Similarly, the ability to know symbol transformations amounted (6.20%), then each of (remembering symbol units, distinguishing transformations symbols, enumeration of symbol units, presenting transformation of symbols) by (6.17%). The ability to write relationships between symbols scored (6.11%), and knowing symbol units formed (6.08%) of the mental abilities in the textbook.

The abilities of knowing units of figures, units of meanings, units of behavioral situations, knowing the categories of meanings, categories of behavioral situations, knowing the relationships between meanings, between behavioral situations, knowing the transformations of figures, transformations of meanings, transformations of behavioral situations, remembering units of forms, units of meanings, units of behavioral attitudes, identifying the categories of meanings, describing the relationships between meanings,

between behavioral attitudes, distinguishing transformations of meanings, transformations of behavioral attitudes, enumerating the units of figures, units of meanings, units of behavioral attitudes, classifying categories of symbols, categories of meanings, categories of behavioral situations, writing of relations between meanings, relations between behavioral situations, presenting transformations of meanings, transformations of behavioral situations, evaluating the implications of meaning, identifying units of symbols, units of behavioral attitudes, representing the categories of symbols, categories of meanings, using relationships between symbols, relationships between meanings, naming units of figures, extracting symbol transformations, transformations of meanings, naming units of meanings, units of behavioral attitudes, summarizing the categories of symbols, applying the relationships between meanings, relationships between behavioral attitudes, interpreting the transformations of meanings, the transformations of behavioral attitudes, extracting the inclusions of symbols were variably presented with percentages (0.03% - 5.12%).

Besides, the abilities of knowing of systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, inferencing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, discovering systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes formed (0%) of the mental abilities in the fifth chapter of the textbook.

Chapter Six

The abilities of knowing units of symbols and distinguishing transformations of symbol got the highest percentage in the sixth chapter (Statistics) with a percentage of (5.56%). This is followed by the ability to present transformations of symbols amounted ( ). Besides, the ability to know the relationships between symbols with a rate of (5.41%), then the ability to describe the relationships between symbols with a rate of (5.41%) (5.33%), writing relationships between symbols by (5.26%), knowing the transformations of symbols by (5.18%). Remembering units of symbol amounted (5.10%). However, the presentation of examples and topics fit spirally and cumulatively with these mental abilities.

Furthermore, the abilities of knowing units of figures, units of meanings, units of behavioral situations, knowing categories of meanings, categories of behavioral situations, knowing of the relationships between meanings, relationships between behavioral situations, knowing of transformations of figures, transformations of meanings, transformations of behavioral situations, remembering units of figures, units of meanings, units of behavioral situations, identifying the categories of behavioral situations, describing the relations between meanings, the relations between behavioral situations, distinguishing the transformations of meanings, the transformations of behavioral situations, enumerating units figures, units of meanings, units of behavioral situations, classifying categories of symbols, categories of meanings, categories of behavioral situations, writing relationships between forms, between meanings, between behavioral situations, displaying transformations of meanings, transformations of behavioral situations, representing categories of symbol, using of relationships between symbols, relationships between behavioral situations, extracting transformations of symbol, transformations of behavioral situations, naming units Jof figures, units of meanings, naming units of behavioral attitudes, summarizing categories of symbols, applying relationships between meanings, applying relationships between behavioral

attitudes, interpreting transformations of meanings, transformations of behavioral attitudes were represented varyingly between (0.08% - 3.48%).

Nevertheless, the abilities of knowing the categories of figures, knowing the relationships between figures, knowing the implications of figures, knowing the implications of symbols, the implications of meanings, the implications of behavioral situations, defining categories of figures, categories of meanings, describing relationships between figures, distinguishing transformations of figures, clarifying the implications of figures, clarifying the implications of symbols, the implications of meanings, the implications of behavioral situations, classifying categories of figures, presenting transformations of figures, evaluating the inclusions of figures, evaluating the inclusions of symbols, the implications of meanings, the implications of behavioral situations, defining units of figures, units of symbols, units of meanings, defining the units of behavioral attitudes, representing classes of figures, classes of meanings, classes of behavioral attitudes, using relationships between figures, relationships between meanings, extracting transformations of figures, transformations of meanings, finding the inclusions of figures, the inclusions of symbols, the inclusions of meanings, the inclusions behavioral attitudes, summarizing the categories of figures, summarizing the categories of meanings, summarizing the categories of behavioral attitudes, applying the relations between figures, interpreting the transformations of figures, extracting the implications of the figures, extracting the implications of symbols, extracting the implications of meanings, extracting the implications of behavioral attitudes appeared in (0%) of the sixth chapter of the math textbook.

Furthermore, Besides, the abilities of knowing of systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, inferencing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, discovering systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes formed (0%) of the mental abilities in the six chapter of the math textbook.

Chapter seven

The ability of knowing the units of symbols occupied the highest rates in the seventh chapter (Parallel lines and circle) with a rate of (7.29%), then writing the relations between symbols with a rate of (7.21%), followed by knowing the relations between symbols with a rate of (7.17%). Remembering units of symbol amounted (6.88%). Knowing the categories of symbol scored (6.31%), then presenting the transformations of symbol by (6.11%) and knowing the transformations of symbol represented in (5.86%) of the mental abilities of the seventh chapter.

In the same vein, the abilities of knowing units of meanings, units of behavioral situations, knowing the categories of figures, knowing the relationships between figures, between meanings, between behavioral situations, knowing the transformations of behavioral situations, remembering units of figures, units of meanings, units of behavioral situations, defining categories of figures, describing relationships between figures, between meanings, between behavioral situations, distinguishing transformations of symbols, enumerating units of figures, of meaning, units of behavioral situations, writing relationships between figures, between meanings, between behavioral attitudes, presenting transformations of behavioral

attitudes, defining units of symbols, presenting categories of symbols, using relationships between symbols, extracting transformations of symbols, naming units of figures, units of meanings units of behavioral situations, summarizing categories of symbols, applying relations between figures, between meanings, between behavioral attitudes were represented in various percentages between (0.04% - 5.09%).

For the abilities of knowing categories of meanings, categories of behavioral situations, knowing of transformations of figures, transformations of meanings, knowing the inclusions of figures, the inclusions of symbols, knowing of the implications of meanings, the implications of behavioral situations, identifying the categories of meanings, categories of behavioral situations, distinguishing the transformations of figures, clarifying the implications of figures, the implications of symbols, the implications of meanings, the implications of behavioral situations, classifying categories of figures, categories of symbols, categories of meanings, categories of behavioral situations, evaluating the implications of figures, the implications of symbols, the implications of meanings, the implications of behavioral attitudes, defining units of meanings, units of behavioral situations, representing categories of figures, categories of meanings, categories of behavioral situations, using of relations between figures, between meanings, between behavioral situations, extracting the transformations of figures, transformations of meanings, transformations behavioral situations, finding the implications of figures, the implications of symbols, the implications of meanings, the implications of behavioral situations, summarizing categories of figures, categories of meanings, categories of behavioral situations, interpretation the transformations of figures, transformations of meanings, transformations of behavioral attitudes, extracting the inclusions of figures, inclusions of symbols, inclusions of meanings, inclusions of behavioral situations were not presented in chapter (parallel lines and circle).

Furthermore, the abilities of knowing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, systems of symbols, systems of meanings, identifying systems of behavioral attitudes, inferencing systems of figures, systems of symbols systems of meanings, systems of behavioral attitudes, discovering systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes were not represented in the seventh chapter and got (0 %).

Chapter eight

The ability to knowing the units of figures in the eighth chapter (Geometrical figures) got the highest percentage (8.31%), followed by the ability to enumerate the units of figures by (8%). Remembering the units of figures was represented by (7.45%), identifying the categories of figures by (6.40%). Likewise, knowing the categories of figures amounted (6.34%) and naming the units of figures scored (5.91%) of unit eight.

Besides, the abilities of knowing units of symbols, units of meaning, units of behavioral attitudes, knowing categories of symbols, categories of behavioral attitudes, knowing the relationships between figures, relationships between symbols, the relationships between meanings, the relationships between behavioral situations, knowing transformations of figures, transformations of symbols, transformations of behavioral attitudes, remembering units symbols, units meaning, units of behavioral attitudes, identifying categories of symbols, describing the relationships between symbols, enumerating units of symbols, units meaning, units behavioral attitudes, classifying categories of figures, categories symbols, writing the

relationships between figures, between symbols, between meanings, between behavioral situations, presenting transformations of symbols, transformations of meaning, enumerating units of symbols, identifying units of behavioral attitudes, representing categories of symbols, using relationships between figures, using relationships between symbols, extracting transformations of symbols, naming units of symbol, units of meaning, units of behavioral attitudes, applying relationships between figures, applying relationships between symbols, relationships between behavioral attitudes, interpreting the transformations of figures, the transformations of symbols were represented in a variable percentage between (0.06% - 4.50%).

The abilities of knowing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, inferencing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes. Systems of figures: discovering systems symbols, systems of meanings, systems of behavioral attitudes, arrangement of systems of figures, arranging systems of symbols, systems of meanings, systems of behavioral attitudes was ignored to be represented in the textbook. They appeared (0%)

Chapter nine

The abilities of knowing the relationships between symbols and writing the relationships between symbols came in the ninth chapter (measurement) with the highest percentage (7.11%), followed by the ability to remember units of symbol with a rate of (6.85%). Besides, the abilities of knowing units of symbols and enumerating units of symbols amounted (6.69%); the ability to remember units of symbols scored (6.69%). Presenting the transformations of symbols amounted (5.92%), then the ability to remember the units of figures by (5.66%). Likewise, the ability to know the transformations of symbols were represented by (5.46%), the enumeration of the units of figures by (5.51%). The application of relations between symbols was represented by (5.36%) of the unit nine.

Similarly, the abilities of knowing units of meanings, units of behavioral attitudes, knowing categories of figures, categories of symbols, categories of meanings, categories of behavioral situations, knowing the relationships between figures, the relationships between meanings, the relationships between behavioral situations, knowledge of transformations of figures, transformations of meanings, transformations of behavioral situations, remembering units of figures, units of meanings, units of behavioral situations, identifying categories of meanings, categories of behavioral situations, describing relationships between meanings, between behavioral situations, distinguishing transformations of meanings, transformations of behavioral situations, clarifying the implications of meanings, implications of symbols, the implications of behavioral situations, enumerating the units of figures, units of meanings, units of behavioral situations, classifying categories of symbols, categories of meanings, categories of behavioral situations, writing the relationships between meanings, between behavioral situations, presenting transformations of meanings transformations of behavioral situations, evaluating the inclusions of symbols, the inclusions of meanings the inclusions of behavioral attitudes, defining units of symbols, units of behavioral attitudes, representing categories of symbols, using of relationships between symbols, naming units of figures, units of behavioral attitudes varied in their representation and scored between (0.05% - 4.94%(.

Furthermore, the abilities of knowing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, recognizing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, inferencing systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes, discovering systems of figures, discovering systems of symbols, systems of meanings, systems of behavioral attitudes, arranging systems of figures, systems of symbols, systems of meanings, systems of behavioral attitudes appeared (0%) of chapter eight of textbook.

Conclusions

From the results of the research, the following was concluded:

There is a discrepancy in the percentages and frequencies of including the mental abilities and at the level of the mathematics textbook for the sixth grade as a whole.

The content of the mathematics book for the sixth grade focused on cognitive thinking abilities, memory abilities, divergent thinking abilities, then evaluative thinking abilities, and finally divergent thinking abilities.

The following abilities did not appear at the level of the chapters of the book as a whole: Knowledge of systems of figures, knowledge of systems of symbols, knowledge of systems of meanings, knowledge of systems of behavioral attitudes, knowledge of the implications of figures, knowledge of the implications of behavioral situations, recognition of systems of figures, recognition of systems of symbols, identifying systems of meanings, identifying systems of behavioral attitudes, clarifying the implications of figures, inferring systems of figures, inferring systems of symbols, inferring systems of meanings, inferring systems of behavioral attitudes, evaluating the implications of forms, discovering systems of figures, discovering systems of symbols, discovering systems of meanings, discovering systems of behavioral attitudes, finding the implications of figures, finding the inclusions of symbols, finding the implications of meanings, finding the inclusions of behavioral attitudes, summarizing categories of figures, arranging systems of figures, arranging systems of symbols, arranging systems of meanings, arranging systems of behavioral attitudes, extracting the inclusions systems of figures. These abilities are not suitable for the research sample, which is the mathematics textbook for the sixth grade of primary school.

Implications

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

i. The curriculum developers in the General Directorate of Curricula are called to get benefit from the math book content analysis card according to the mental abilities of the Guilford model when making any modification, change or development in its content.

ii. Including and enriching the content of the mathematics book for the sixth grade of primary school with situations related to the mental abilities of the Guilford model, especially those that appeared at a weak rate.

iii. Taking into account the integration, sequence and coordination between the chapters of the book in terms of providing them with exercises that enable students to develop their mental abilities.

iv.   Reconsidering the planning and writing of the mathematics textbook for the sixth grade of primary school in order to be compatible with modern trends that call for the development of education in a way that develops the mental abilities of all learners at different educational levels.

Recommendations

The researchers recommend conducting similar studies on:

1) Identifying the percentages of inclusion of mental abilities according to Guilford model in the mathematics casebooks of other grades of the primary schools.
2) Analyzing the contents of mathematics books of primary schools according to Guilford model of Mental abilities.
3) Evaluating the mathematic books of six grade of primary schools according to Guilford model of Mental abilities.
4) Analyzing the content of mathematics textbooks for the intermediate and secondary stages according to the Guilford model of mental abilities.

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