

Evaluation of Science Curriculum for the Sixth Elementary Grade in the Schools of the Hashemite Kingdom of Jordan

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Abstract

The current study aimed at identifying the extent to which the science curriculum of the sixth elementary grade meets the needs of gifted students in Irbid governorate – Jordan. To achieve the study objectives, the researcher has developed a list of the most important needs of gifted students and a list of criteria for those needs. The lists validity was verified by presenting them to a group of referees specialized in science curriculum and teaching methods. The study has reached a group of results, the most important of which are that: The needs of gifted students in all aspects of the curriculum are highly met; the physical needs of gifted students were met to a high degree, with the exception of the curriculum outcomes where the satisfaction rate was moderate. The social needs of gifted students in all aspects of the curriculum were met with high degree of satisfaction. The psychological needs of gifted students in all aspects of the curriculum were met with high degree of satisfaction. The counseling needs of gifted students were met with a moderate degree of satisfaction, except the outcomes area with a low degree of satisfaction. The study concluded with a number of recommendations, most notably of them: the need to pay attention to the needs of gifted students in science curriculum in the elementary stage, which helps to motivate gifted students to further progress and help them achieve self-fulfillment.

Keywords: Evaluation, Science Curriculum, Elementary Grade, Jordan

Introduction

The world has witnessed scientific developments in various fields of life. These developments have clearly left their mark, affecting various aspects of life, including the educational process. The educators called for the need to benefit from these developments to promote and develop the educational process. The educational process is an active process due to the development of life and societies, and it is therefore appropriate to adapt the curriculum to this change so that education achieves the desired aspirations and objectives.

Jordan was not spared from the reform and development movements in the educational curriculum that took place during the last decades of the last century. Jordanian curriculum in general and the science curriculum in particular, have undergone successive development stages that have extended to the present. The First National Conference for Educational Development convened in 1987, where of its recommendations in the field of science curriculum, to redraft the curriculum to meet the individual and social needs of the learner; to cope with social, economic, scientific and technological changes and to provide science through social problems, events and issues, in addition to be presented as a conceptual structure (Ministry of Education, 1988).

The needs of gifted students came from their physical, mental, cognitive or social characteristics and features. There was agreement between the majority of research and studies on these characteristics and features, which must be observed and met, and if not met, will show negative symptoms on the student himself and the community (Al-Srouf, 2000).

Statement of the Problem

There is no doubt that the curriculum development project in the Hashemite Kingdom of Jordan, especially the curriculum of science, came from the need to keep pace with the development and technical progress that the world is witnessing. The curriculum is one of the factors that contribute to the development of talent among students. If the curriculum is designed primarily for such a group, it will contribute to the better preparation of them, but if the curriculum was not designed to fit the capabilities and preparations of these students, it will contribute to their boredom. Alzuheiri (2003) pointed out that there is a deficiency in the current curriculum as they are unsuitable for the abilities of outstanding students.

Therefore, the regular school curriculum does not meet the needs of gifted students and does not challenge their abilities. Hence, educators emphasize the importance of the principle of differentiation in curriculum components in terms of objectives, content, teaching methods, learning outcomes, methods of assessment, and the nature of classroom climate, so as to stimulate the motivation of these students to learn, think and creativity, where the weakness of the curriculum results in a lack of opportunities for challenge and a lack of interest and motivation for achievement (Salameh, Abul'ezz, 2000).

As a teacher of science curriculum for the basic stage in the Hashemite Kingdom of Jordan, the researcher noted many aspects related to the inadequacy of the science curriculum in terms of the needs of gifted students, and of the indications of the existence of a problem in this aspect are:

- 1- Weakness in providing students with higher order thinking skills of analysis and investigation.
- 2- Weakness of curriculum in terms of overall student growth, and devoting attention to the cognitive aspect of information.
- 3- Weakness of students' needs, tendencies, and problems.
- 4- Weakness in formation of habits and positive trends.

Study Questions

Therefore, as a result of the above, and as the researcher is a science teacher of different school stages for a number of years and given his interest in the category of gifted students, the problem of this study is developed and formed, which is concerned with the development of a proposed vision for a curriculum that meets the needs of gifted students, where the study aims to answer the following major question:

"What is the extent to which the science curriculum of the sixth grade achieves the needs of gifted students in Jordan?"

The following sub-questions are formulated:

- 1- What are the needs of gifted students that must be met through the science curriculum of the primary education stage?
- 2- What criteria should be available in the science curriculum for the sixth grade in Jordan?
- 3- How satisfied are these needs and standards in the science curriculum of the primary education stage in Jordan?

Study Objectives

The current study aimed at:

1. Identifying the needs of gifted students to be achieved in the science curriculum for the sixth grade.
2. Determining the extent to which the science curriculum of the sixth grade achieves the needs of gifted students in Jordan.

Importance of the Study

This study is an attempt to develop a list of criteria for the science curriculum of the primary education stage in the Hashemite Kingdom of Jordan in accordance with the needs of gifted students. The importance of this study is as follows:

- 1) The current study may provide curriculum designers and developers with a list of criteria for the needs of gifted students, in order to take them into consideration when developing curricula and writing curricular textbooks related to them.
- 2) It can benefit the people working on gifted students by providing them with an intellectual framework helps in designing special curricula for this category of students.
- 3) This study is a feedback for teachers of gifted and staff supervising the cognitive and non-cognitive needs of gifted students represented of behavioral, emotional, academic and mental needs, leading to a better understanding of the characteristics of gifted students and how to meet their needs.
- 4) Contribute to motivate researchers to conduct similar studies on science curriculum for other school stages, and on curriculum of different branches, according to the results of this study.

Operational Definitions

Gifted Students: Students who show continuous superiority in the intellectual and skills aspects, and have high performance through the primary stage.

Science Curriculum: Science curriculum of the sixth primary grade in the schools of Irbid governorate – Jordan.

Gifted Students' Needs: Cognitive needs associated with intellectual and emotional abilities, and non-cognitive needs associated with the personal, psychological, emotional and social aspects of gifted students.

Background and Literature Review

Introduction

The reform movements of teaching and development of science curriculum began in the middle of the twentieth century and were all aimed at developing science curricula in line with the tremendous scientific and technological progress and fulfilling the needs and desires of learners. By tracing the development of science curriculum during this century, it is noted that the three areas of practical education objectives (scientific cognitive, scientific method, learner in all aspects) are continue.

Science Curriculum

Since the mid-twentieth century, science curriculum in many countries of the world has witnessed constant movement for development, reformulation and reform. The aim of this scientific movement is to develop curriculum that keep pace with scientific and technological development, in the light of the keenness of many countries in the world to prepare scientifically qualified manpower capable of making change happen and contribute to the progress of nations and societies. To this end, countries have been keen to follow the global trends and achieve universal standards of science education so that they can find a place among the developed countries which take stock of the achievements of science and its applications.

The Role of Science Curriculum in Meeting the Needs of Gifted Students

The gifted students' curriculum comes from the overlap of more than one factor and the interaction of these factors together, in addition to the objectives, content and learning processes and among the interrelated interactive processes that are included in the gifted students' curriculum for the students themselves, the continuous interaction between these students and the strong relationship between them and the services provided to them and the goals, their levels and the possibility of achieving them. From this point of view, it is important to take care of curriculum of the gifted students and the needs of their excellence as a self-contained group from other students (Qatnani and Mreizeq, 2012).

Perhaps there is no area of the curriculum that captures the curiosity and interests of many gifted students and their cultural spirit more than science, as it is the main concern of many of them (Baska and Stambaugh, 2013). The teaching of science reflects the nature of science that deals with natural phenomena, both living and non-living, and the interrelations between them and their environments. The used teaching methods must be in line with the modern trends in the participation of students in a practical and effective manner in scientific observations and experiments, environmental applications, classroom and extra-curricular activities, which paves the way for the transition from education to learning, instilling scientific trends and acquiring scientific thinking skills to be able to explain individual and social life and environmental aspects in a scientific and holistic manner that will enable them to develop an integrated environmental awareness (Al-Oteibi, 2013).

Students' needs for science education are seen as complex needs that require many solutions simultaneously, and these needs can be clarified as follows (Baska and Stambaugh, 2013):

- Develop a curriculum model that reflects the new elements and standards of the science and is appropriate for gifted students.
- Changes in the tests and the use of curriculum materials.
- Educational strategies that complement scientific inquiry and demonstrate effectiveness with different learners.
- Teachers who have attitudes and behaviors and accept the importance of curriculum and educational change.
- Automated evaluation methods that focus on unlimited tasks, problem solving and educational portfolio models.

The gifted students need an advanced curriculum that challenges their abilities and provides them with a series of tasks that expand their knowledge, a curriculum that offers opportunities of original research in science and the use of real problems as a starting point, and they have urgent need to study important scientific concepts that allow connectivity in the fields of science and other fields.

Needs of Gifted Students

The care that gifted students need is more than just helping to develop their mental and cognitive abilities, but also the provision of extension, social and psychological services that many educators consider to be a basis for positive mental growth in order to effectively invest their energies and abilities for their individual and societal interests (Silverman, 1997).

I. Psychological Needs:

The necessary requirements for satisfying the emotional and psychological side of the individual. Gifted category has many psychological needs, including the need for foresight:

- The need for self-insight into their readiness and awareness to realize their readiness.
- The need to recognize their talents and abilities.
- The need for independence and freedom of expression.
- The need for self-affirmation.
- The need for understanding based on empathy, and the unconditional acceptance of others.
- The need to develop a positive self-concept.
- The need for more specialized care.
- The need for more appreciation of others.
- The need for further achievement.
- The need for self-understanding.

II. Mental-Cognitive Needs:

Mental requirements such as the need for thinking, experimentation and discovery, and all of them need to be satisfied. The gifted category has several mental needs, including:

- The need for reconnaissance, discovery and experimentation.
- The need for self-learning skills and investment of learning and knowledge resources.
- The need for further knowledge in the field of talent and excellence.

- The need for educational curriculum and educational activities that challenge their readiness, and their own way of thinking.
- The need for acquire the skills of experimentation and scientific research, the examination of ideas, the search for solutions, propose hypotheses and testing them in the real world, and discuss the results.
- The need for knowledge structures that make them reach the level of mastery.
- The need for knowledge acquisition skills.

III. Social Needs

Social requirements, including the need for forming social relations, friendships, cooperation, integration and interaction with others. The social needs of gifted students include:

- The need to form a productive social relations, and healthy communication with others.
- The need to acquire consensual skills, and how to handle with stress.
- The need to address academic problems and emotional difficulties.
- The need for social integration (Jarwan, 2004).

IV. Physical Needs:

These needs can be subdivided into:

- Sensory and Motor Needs: Teachers should pay special attention to the provision of necessary activities to meet these sensory-motor needs, and to develop them in an integrated manner with the other areas of growth and developments.
- Developmental Needs: Gifted students need support from family and peer, as well as developmental and biological needs. These require special care differ from the areas of sensory-motor, mental, imagination and emotional dimensions.

Literature Review

A study by Al-Shalabi (2011):

The study aimed at identifying the social and emotional needs of gifted students, and evaluating the extent to which these needs are met among students at King Abdullah II School of Excellence. The results showed that there were statistically significant differences in the level of evaluating the extent to which the social and emotional needs of gifted students are met in favor of male students. The results also revealed that there are statistically significant differences in the level of evaluating the extent to which the social and emotional needs of gifted students are met in favor of the primary education stage.

A study by Wood (2010)

The study aimed at comparing the counseling methods and strategies used for gifted students by school counselors with the methods and strategies most frequently cited in the gifted education literature. As well as, determining which of these practices were actually best for gifted students.

A study by Kesici (2008)

This study was conducted in Turkey on the students' counseling needs according to parents' views. The data were collected using semi-structured interview technique.

The findings revealed that the most prominent counseling needs of these students as identified by their parents were as follows: find more efficient methods of learning; address their lack of motivation; overcome examination anxiety; address their lack of interest and attention; enable them to take on responsibilities; help them cope with changes in body.

A study by Al-Khawaldeh (2006)

The study aimed at evaluating the gifted students' special programs in the Hashemite Kingdom of Jordan from the teachers and students' view. The results of the teachers and students' responses showed that the nature of the offered curriculum is good and has good characteristics. As for the teaching methods, the results of the teachers' responses confirmed that the teaching methods provided are effective, varied, and increase the students' abilities. With regard to the educational guidance curriculum corresponding to the presented curriculum, the results of the students' responses indicated that the guidance curriculum take into consideration some of the needs and abilities of the gifted student and not in all aspects of their different personality.

A study by Yoo & Moon (2006)

This study aimed at investigating the counseling needs of gifted students from the perspective of parents who sought help from a fee-based counseling center for gifted students, and comparing the perspective of parents on two age groups (elementary education stage, secondary education stage). The results showed that the age group had a statistically significant effect on the parents' view of the emotional problems and their impact on the gifted student at home and school. The findings also revealed that the parents perceived the importance of educational counseling for their children at all levels of education with emotional concerns for the gifted children.

A study by Reis & Colbert (2004)

The study aimed at determining the academic needs of students who were both academically talented and learning disabled. A questionnaire was distributed to a sample of 15 individuals. The results showed that the characteristics of academically talented students with learning disability in the social and emotional fields are as follows: low self-esteem, lack of self-confidence, unrealistic expectations of the self, exhibit an intensity of emotions, exhibit personal needs of excellence in performance.

A study by Kaplan (2003)

Kaplan (2003) conducted a study on gifted students. The study pointed to the need to pay attention to the teaching methods that must be mastered by teacher, and some may be among the programs of preparing the teacher at the university level, and not only the content of knowledge. The most important of these methods: Socrates dialogues, research skills, problem solving in creative ways and other methods.

A study by Van Tassel (2002)

The study found that gifted children spend most of their time in regular school classes. They need to what so-called curricular differentials to meet their mental needs according to their mental abilities rather than within the age group.

Methodology

Introduction

This chapter dealt with the procedural measures followed by the researcher to achieve the objectives of the study. This includes the used method, the steps of developing the study tool, verifying its validity and reliability, and extracting the results.

Study Method

The descriptive analytical method is adopted as this approach fits the nature of the current study; the descriptive approach describes and interprets the case and is also interested in identifying the criteria necessary to meet the needs of gifted students.

Study Population and Sample

- **Study Population:** consists of the science curriculum for sixth elementary grade in Jordan.
- **Study Sample:** consists of all sample population of the science curriculum for sixth grade in Jordan.

Study Tools

A- *Content Analysis Tool:*

The tool was developed by following these steps:

1- Deriving a set of criteria in light of the following:

- List of the gifted students' needs to be available in science curriculum for the elementary stage in Jordan.
- A list of criteria for the curriculum of the elementary stage in Jordan in light of meeting the needs of gifted students.
- The Next Generation Science Standards "NGSS".
- National Science Education Standards "NSES"

They have been classified into five areas according to the curriculum elements as follows:

- A) Outcomes: 31 indicators.
- B) Content: 29 indicators.
- C) Teaching Methods: 28 indicators.
- D) Learning Activities: 31 indicators.
- E) Evaluation Methods: 32 indicators.

Tool Validity

After the preparation of the study tool in its initial form, its face validity was verified by be presented to a group of referees with expertise and experience in the field of curriculum, teaching methods, assessment and evaluation, supervisors of science curriculum and science teachers of the elementary stage. The approval of (80%) of the referees on the content of each paragraph is an indication of its validity. A number of referees have proposed their suggestions to amend some of the indicators and reformulate them. 12 indicators have been canceled because they did not get approval of 80% of referees. Accordingly, the number of paragraphs of the final tool has become 151 indicators; outputs: 31 indicators, content: 29 indicators, teaching methods: 28 indicators, educational activities: 31 indicators, evaluating methods: 32 indicators.

Tool Reliability

The reliability of analysis method through individuals was used. The researcher agreed with another analyst to analyze two units of the science book for the sixth grade. The reliability was calculated using the Holsti equation (Ta'ima, 2008).

$$R = \frac{2(C_{1,2})}{C_1 + C_2}$$

Where:

R = Reliability coefficient.

$C_{1,2}$ = the number of category assignments both coders agree on.

C_1 = the number of category assignments made by first coder.

C_2 = the number of category assignments made by second coder.

After the application of the Holsti's formula, the reliability coefficient was (83.0), which is a high reliability coefficient leads the researcher to use the analysis tool, making it highly reliable to achieve the study objectives as shown in the following table:

Table 1

Reliability of Analysis Tool

Area	1 st Coder	2 nd Coder	Agreement Points	Reliability coefficient
Outcomes	31	31	25	0.81
Content	29	29	25	0.86
Teaching Methods	28	28	22	0.79
Learning Activities	31	31	27	0.87
Evaluation Methods	32	32	27	0.84
Total	151	151	126	0.83
Overall Reliability coefficient	0.83			

Results

First Question: What are the needs of gifted students that must be met through the science curriculum of the primary education stage?

To answer this question, the researcher developed a list of the needs of gifted students through the following steps:

- 1) Review the previous studies, researches, projects and international experiences that have focused on the development of science curriculum, such as (Rawashdeh, 2015), (Shoaib, 2013), (Mukhaimer, 2012), (Shavininina, 2009), (Kerr, 2009).
- 2) The theoretical framework of the study.
- 3) Developing a list of the gifted students' needs, including 5 main fields: (Mental-Cognitive Needs, Physical Needs, Social Needs, Psychological-Emotional Needs, Counseling Needs). The list was presented to a group of specialized referees specialized in science curriculum, teaching methods, and gifted and talented learning. Each paragraph contains 3 choices to be assessed (The extent to which the paragraph belongs to the field, The extent to which the paragraph is appropriate for the age group, The linguistic integrity of the paragraph). The referees have recognized the importance of the needs in the list with some amendments based on their views.

- 4) Finalize the list in light of the referees' opinion. Further to make the amendments, the list became in its final form.

Second Question: What are the criteria that must be met in the science curriculum for the sixth grade essential to meet the needs of gifted students in Jordan?

The second question was answered through the following steps:

1) To view the international projects and experiments that have been interested in developing science curricula, including:

- Next Generation Science Education Standards (The Next Generation Science Standards "NGSS.")
- National standards for scientific education (National Science Education Standards "NSES.")
- Previous studies.
- The theoretical framework of the study.
- List the needs of gifted students to be addressed in the science curriculum by answering the first question.

2) The list of criteria in its preliminary form is presented to a group of arbitrators specialized in curriculum, teaching methods, science supervisors, (4) options for judging them (standard relevance of the field, appropriate criterion for the curriculum element, appropriate criterion for the basic stage, linguistic integrity of the standard). The judges recognized the importance of criteria in the list and some amendments were made based on the views and proposals of the arbitrators, (7) indicators were deleted because they are unsuitable for the school stage, rewording (5) indicators.

3) Finalization of the list of criteria for the science curriculum for the basic stage, which included (5) main areas: (Outputs, content, activities, teaching strategies, assessment methods). Each area (5) may include key criteria that represent the extent to which each area meets the needs of gifted students and each criterion includes a number of sub-indicators.

Third Question: What is the extent to which the science curriculum of the sixth grade achieves of needs of gifted students in Jordan?

To answer this question, the researcher analyzed the content of the science curriculum for the sixth grade. The results of the analysis were as follows:

1st Area: Outcomes.

2nd Area: Content.

3rd Area: Teaching Methods.

4th Area: Learning Activities.

5th Area: Evaluation Methods.

Table 2

The extent to which the outcomes of the science curriculum of the sixth grade have met the needs of gifted students

Class	6 th Grade	Degree of Fulfilment
Needs		
Mental	66%	High

Physical	53%	Moderate
Social	76%	High
Psychological-Emotional	61%	High
Counseling	33%	Low

From the above table, we note that the outcomes of the science curriculum for the sixth grade meets the mental, social and psychological - emotional needs with a high degree of fulfilment, the physical needs with a moderate degree of fulfilment, and the counseling needs with a low degree of fulfilment.

Table 3

The extent to which the content of the science curriculum of the sixth grade have met the needs of gifted students

Class	6 th Grade	Degree of Fulfilment
Needs		
Mental	65%	High
Physical	67%	High
Social	61%	High
Psychological-Emotional	63%	High
Counseling	45%	Moderate

From the above table, we note that the content of the science curriculum for the sixth grade meets the mental, physical, social and psychological - emotional needs with a high degree of fulfilment, and the counseling needs with a moderate degree of fulfillment.

Table 4

The extent to which the teaching methods of the science curriculum of the sixth grade have met the needs of gifted students

Class	6 th Grade	Degree of Fulfilment
Needs		
Mental	61%	High
Physical	61%	High
Social	70%	High
Psychological-Emotional	61%	High
Counseling	47%	Moderate

From the above table, we note that the teaching methods of the science curriculum for the sixth grade meets the mental, physical, social and psychological - emotional needs with a high degree of fulfilment, and the counseling needs with a moderate degree of fulfilment.

Table 5

The extent to which the learning activities of the science curriculum of the sixth grade have met the needs of gifted students

Class	6 th Grade	Degree of Fulfilment
Needs		
Mental	66%	High
Physical	65%	High
Social	66%	High
Psychological-Emotional	65%	High
Counseling	56%	Moderate

From the above table, we note that the learning activities of the science curriculum for the sixth grade meets the mental, physical, social and psychological - emotional needs with a high degree of fulfilment, and the counseling needs with a moderate degree of fulfilment.

Table 6

The extent to which the evaluation methods of the science curriculum of the sixth grade have met the needs of gifted students

Class	6 th Grade	Degree of Fulfilment
Needs		
Mental	63%	High
Physical	62%	High
Social	63%	High
Psychological-Emotional	64%	High
Counseling	55%	Moderate

From the above table, we note that the evaluation methods of the science curriculum for the sixth grade meets the mental, physical, social and psychological - emotional needs with a high degree of fulfilment, and the counseling needs with a moderate degree of fulfilment.

Recommendations

Based on the study results, the researcher recommends the following:

Reconsidering the planning, organization and development of science curriculum for the elementary stage to meet the needs of gifted students.

- 1- The planners and developers of science curriculum for the elementary stage in Jordan need to pay attention to enrich the science curriculum with the thinking higher skills in general and critical thinking skills in particular.
- 2- The need to review the content of science books for the elementary stage and work to develop them to avoid the shortcomings in meeting the counseling needs of the gifted students, and promote the strengths and positive aspects.
- 3- Reconsidering the science curriculum for the elementary stage to develop leadership skills, self-esteem, and scientists' estimation for knowledge development.
- 4- Advocate the curriculum planners to take into account the different tendencies and trends of gifted students in the development and design of curriculum.

- 5- Increasing the awareness of science teachers on international standards to meet the needs of gifted students.
- 6- Analyze the content of new textbooks to determine how well they meet the needs of gifted students.

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