CSCanada
Canadian Social Science
Vol. 15, No. 2, 2019, pp. 1-9
DOI:10.3968/10797

ISSN 1712-8056[Print]
ISSN 1923-6697[Online]
www.cscanada.net
www.cscanada.org

The Cognitive Growth Process and Knowledge Acquisition among Scientific and Humanitarian Majors at Qassim University in Light of Some Variables

Safaa Yadak[a],*

[a]Associate professor. Psychology Department/ Faculty of Education, Qassim University, Qassim Province, Saudi Arabia.
*Corresponding author.

Received 14 November 2018; accepted 24 January 2019
Published online 26 February 2019

Abstract

The study aimed to examine the learning and cognitive growth factors as two correlated concepts that transfer knowledge from its primitive state to a final stable state that reflects in successful activities adults are able to perform. The difference between weak and fluctuating performance at the beginning of the learning and cognitive growth exists. To find the difference the current study attempted to answer the following questions:

(a) What is the level of knowledge acquisition among the students of Qassim University?

(b) Are there significant differences at (α=0.05) between means of participants responses on the knowledge acquisition test attributed to the type of the major (scientific or humanitarian), academic level (third or seventh academic) and their interaction?

The author selected (240) female participant by the simple random sampling method from the third and seventh academic levels in both majors scientific and humanitarian. To achieve the goals of the study the author constructed a test to measure knowledge acquisition.

The first question means results range between (3.11-3.50), the mental processes ranked first and its mean scored (3.50) degrees, symbolic systems ranked last, and its mean scored (3.11) degrees. The overall mean of the test scored (3.30) degrees.

The second question results illustrated significant differences at (α=0.05) attributed to the academic level, f-value scored (735.554) and a significance of (0.000) in favor of the seventh academic level. Significant differences at (α=0.05) attributed to major appeared, f-value scored (3411.658) and a significance of (0.000), in favor of the scientific majors. The impact of the interaction between the major and academic level differences proved to be significant at (α=0.05).

Key words: Cognitive growth process; Knowledge acquisition process

Yadak, S. (2019). The Cognitive Growth Process and Knowledge Acquisition among Scientific and Humanitarian Majors at Qassim University in Light of Some Variables. *Canadian Social Science, 15*(2), 1-9. Available from: http://www.cscanada.net/index.php/css/article/view/10797
DOI: http://dx.doi.org/10.3968/10797

INTRODUCTION

The Relationship between the Learning and Cognitive Growth Processes

Many scientists distinguish learning from cognitive growth; the difference is found in knowledge acquisition, and it is attributed to the cognitive growth theory of Piaget (1974), and the behavioral theory of Thorndike (1977); Skinner (1971); Osgood (1953) and Hull (1952). According to Piaget (1974), the interaction with the surrounding has a basic role in knowledge constructing. Individuals achieve cognitive growth by a series of stages in the form of cognitive cumulative structures that move toward abstracting until it reaches construction of logic and mathematical symbols. That means the cognitive theory gave priority to cognitive growth followed by learning while the behavioral theory advocates believe that learning is based on motivation that draws responses followed by the awarded or punished behavior. Learning does not require maturity conditions, but it needs an appropriate environment to acquire responses. The behaviorists summarized cognitive growth in learning and simplified and isolated it, this led to learners negligence and made them a part of the environment, therefore, learning turned to be educating.

Scrutinizing the literature of the behavioral and cognitive theories, guided the author to find two contrasted situations:

First. Chomsky (1968) presented the primitive trend. He said that we acquire language by instinct; language is not learnt but is grows cognitively naturally. The behaviorist theory advocates think on the other end, they say learning does not happen but the cognitive growth and development occurs.

Second. Vygotsky (1962) presented the sociocultural trend, he confirmed the possibility of learning transference into cognitive growth, that means real learning precedes cognitive growth. Vygotsky (1962) said that cognitive growth has two levels: the first one is the current level that the individual have reached, and the second is the implicit level and the area that separates between the two levels is termed the zone of proximal cognitive growth. He believes that the best learning occurs in this zone and precedes the cognitive growth. That means the best learning leads to cognitive growth through the environment and interaction with others. When individuals assimilate the cognitive mixture, it becomes a part of their cognitive system.

Recently, the modern cognitive psychology theory emerged; it combined between the cognitive and the behavioral theories. The advocates of the theory believed that learning and cognitive growth in the past is termed now knowledge acquisition. It considered learning as a change of knowledge but not behavior, and that learning is a mental activity that uses a number of cognitive processes such as understanding, perception and reasoning, hence any mental activity is considered learning. Learning is not limited by the amount of the information maintained but with how it was obtained. The how occurs only through individuals activity in the surrounding environment. (Aharchaou, 1999)

Learning and cognitive growth share foundations in terms of knowledge acquisition, cognitive growth is the transform of knowledge since birth to adolescents, while learning is the transference of knowledge from a primitive form into the experience acquisition. learning and cognitive growth occur as a result of the individual interaction with the surrounding environment, this means that cognitive growth is knowledge acquisition through time, and learning is the study of what the individual learns in the environment through schooling, the relationship between learning and cognitive growth is part to the whole relation. Knowledge cannot be acquired in a short time, it has to be extended, fragmented, and simplified in time to facilitate the acquisition process. Cognitive growth relates to general knowledge acquisition, learning relates to private knowledge acquisition, and the relation between both is very strong. The abundance of private knowledge leads to general knowledge through inference and derivation, general knowledge leads to private knowledge through learning, hence the relationship is mutual. (Aharchaou & al-Zaher, 2000)

1. TYPES OF KNOWLEDGE ACQUISITION

Despite the challenges facing scientists to determine the types of knowledge, because of its interferences, levels ranking and complexity in terms of content, the cognitive psychology has many distinctive features compared with the knowledge that has conflicting doublets. Piaget (1974) considers the following of the most important knowledge types:

(a) Explicit versus abstract knowledge
(b) Partial versus general knowledge
(c) Scientific versus imaginative knowledge
(d) Procedural versus declarative knowledge

Gombert (1999) said that the first knowledge level is less than the second knowledge. A child experiencing the sensory motor stage, as Piaget (1974) termed it, acquires implicit knowledge first, and then moves gradually to abstract knowledge acquisition. While Pankratius (1990) considers private knowledge the first level followed by general knowledge.

Mounoud (1994) model represents a new vision in explaining knowledge acquisition method. He believes that knowledge has two facets regardless of its level: the first is practical and the second is imaginative. He presumes that these two facets evolve in one circle, the practical knowledge transforms into imaginative and the imaginative transforms into practical.

So the discussion revolves around what knowledge students in different majors acquire. Necessary knowledge may be categorized in three types: mental processes, concepts, and symbolic systems. (Carey, 1985)

● The mental processes. Piaget (1974) defines processes as actions and actions create a certain impact. This is the origin of perception and intuition such as performing calculations or drawing. That is, mental processes are rules applied to achieve certain tasks. In comparing mental processes of Piaget (1974) with the information processing theory of the modern cognitive psychology theory, we find that it is a group of organized processes that are implemented in certain conditions and they are more than one process which require coordination between them, therefore, information processing is more complex than the processes.

● Concepts. Concepts are sets of things, events, or symbols of fixed characteristics that meet based on joint features, some concepts are relational, they are characterized by the correlation with other concepts not by fixed features. This characteristic makes relational concepts more complex and abstract compared to other concepts. They are close to scientific concepts such as the concept of acceleration and speed in physics.

● Symbolic systems. Language is a symbolic system acquired by humankind; symbols exist in many abstracted cognitive domains such as mathematics, physics, and engineering, where these majors are hard to understand without learning their own language. Generally, the

information processing system does not work without the symbols that lead to communication and problem solving.

Few studies examined this topic, the following paragraphs show the most important of these studies illustrated chronically. For example, Aharchaou (2007) examined knowledge acquisition method among children and the role of school in it. He found that the child attends school with some knowledge, the role of the school then is to transfer this knowledge from its natural context into a scientific organized context.

Greenfield and Bruner (2006) examined the importance of knowledge acquisition in cognitive growth. They studied the cultural effects on concept formation among children. They compared two homogeneous groups of children of the same age and culture, the first attended school and the second did not attend school. They found statistical differences in participant's performance and achievement. They attributed the differences to the school attendants' ability in abstract independent thinking far away from the context. Unlike the children who did not attend schools, whose thinking depended on the context.

Vygotsky (1980) correlated children's cognitive growth with the school and its role in teaching reading and writing as tools of social and cultural developing of child's thinking. The study found the written language important role as a symbolic system in forming the mental processes.

2. THE STUDY PROBLEM

University is the station for students to acquire specialized knowledge; it has a role in the cognitive growth process and learning as well. It is important to ask about the cognitive transformations that occur among the students in the period of majoring and the relationship of the educational institution and role to develop students' knowledge.

The comparison between students enrolled in scientific and humanitarian majors is considered the simplest method to find knowledge acquisition effects on their efficacy. As far as the author knows, no Arab scholar has examined the process of cognitive growth and knowledge acquisition between different student's majors in the university stage. This scarcity triggered the author to examine the level of knowledge acquisition based on the student major and semester of enrolment by attempting to answer the following questions:

(a) What is the level of knowledge acquisition among the students of Qassim University?

(b) Are there significant differences at (α=0.05) between means of participants responses on the knowledge acquisition test attributed to the type of the major (scientific or humanitarian), academic level (third or seventh semester) and their interaction?

3. IMPORTANCE OF THE STUDY

The current study is important because it attempted to find the method used in knowledge acquisition among Qassim University students enrolled in different majors, and tried to ensure that the acquired knowledge in a certain major is coherent, homogeneous and forms one unit. It tried to find the university role in systemizing the simple knowledge brought by the student about a certain major and combine it with new knowledge offered by the university to produce new knowledge. In addition, it tried to exhibit the importance of cognitive development and learning as two correlated concepts in forming cognitive efficacies and experiences and in developing student's abilities.

4. GOALS OF THE STUDY

(a) Acknowledge that knowledge acquisition processes according the behavioral, analytical and constructivism theories faded in the emergence of the cognitive psychology theory.

(b) Develop effective information processing system, of individuals in general and university students in specific, in a scientific systematic method.

(c) Recognize the need for effective solutions for the different types of the change problems through proper psychological programs.

5. LIMITATIONS OF THE STUDY

Generalizing the results of the study may be limited by its goals, variables, types of tests and procedures. Generalizing is inhibited as well by the participant's selection criteria from Qassim University female students studying in different majors.

6. PROCEDURAL DEFINITIONS

6.1 Cognitive Growth Process

The cognitive growth process is a continuous coherent series of changes that aim to complete the cognitive growth; it does not stop unless an external obstacle obstructs cognitive growth.

6.2 Knowledge Acquisition Process

It is the student's ability to process and transfer knowledge from its mere image into derivatives, combinations or modifications that differ (in quality and quantity) compared to the forms received, then to correlate it with the existing knowledge in memory and merge it to be a part of the learner's cognitive structure (Shalabi, 2001). Knowledge acquisition process is successive knowledge transformations to present knowledge in the present form. Knowledge acquisition process is measured by the degree obtained by answering the test different items.

7. METHODOLOGY

The author utilized the descriptive analytical methodology in analyzing the data collected.

8. STUDY POPULATION

All students enrolled in Qassim University in the scientific and humanitarian majors.

9. STUDY SAMPLE

A simple random sample of the students answered the test items; table 1 illustrates the distribution of the sample.

Table 1
Repititions and Percentages Based on the Study Variables

Variable	Category	Repiition	Percentage
Academic level	Third semester	60	50%
	Seventh semester	60	50%
Major	Scientific	60	50%
	Humaniterian	60	50%
	Total	120	100.0

10. STUDY TESTS

10.1 The Process of Knowledge Acquisition Test

The author examined the previous literature concerned with the process of knowledge acquisition and defined three dimensions to be measured: mental processes, symbolic systems, and concepts.

10.2 Knowledge Acquisition Process Test Validity and Reliability

10.2.1 Face Validity

A group of professors majoring in educational psychology and cognitive psychology from the University of Jordan and Qassim University reviewed the initial version of the test, they provided some comments in terms of representing the dimension, and appropriateness to the level measured and items language suitability. The author worked on the comments and discarded five items from the test, as 90% of the reviewers assured these items inappropriateness. Few items were rephrased also. The reviewers agreed that the items are valid to achieve the goals; this agreement refers to its acceptable validity for the current study. The final version of the test included 34 items.

10.2.2 Construct Validity

The test was administered on a pilot sample of (20) students to verify its construct validity. The author calculated the correlation coefficient of each item with the overall dimension score. The correlation coefficient between the item and the overall score is an indicator of the test construct validity. The Pearson correlation formula was used to calculatd the correlation, all the scores proved its functionality as table 2 illustrates.

Table 2
The Process of Knowledge Acquisition Process Test Correlation Coefficients

Dimension	No.	Items	Correlation coefficient	
			Dimension	Test
Mental processes		I use lines and graphs when I compare knowledge	0.45	0.32
		I use models and tangible material as helpers in the process of remembering	0.45	0.43
		I draw to solve spelling issues	0.42	0.36
		I draw illustrative forms or graphic maps when I try to understand my subjects	0.42	0.33
		I depend on what I have in my mind from former knowledge while receiving new knowledge	0.53	0.49
		I correlate the theoretical and applied while studying	0.48	0.45
		I translate the text while explained in tables and figures	0.47	0.44
		I compare different information then I transfer them into images and figures	0.44	0.37
		I classify images and drawings then I correlate between them	0.47	0.33
		I use images and illustrations while comparing information	0.47	0.43

To be continued

Continued

Dimension	No.	Items	Correlation coefficient	
			Dimension	Test
Symbolic systems		I recognize mathematical formula while reading a mathematical text	0.45	0.44
		I derive data after reading a mathematical text	0.37	0.33
		I use symbols and figures when I answer	0.45	0.37
		I define the farest mathematical relationships included in the text	0.57	0.38
		I read mathematical texts in the right manner	0.44	0.43
		I infere new meanings for the context	0.48	0.46
		I extract the text meaning and correlate it with what I have in my memory	0.44	0.40
		I combine the text words to produce new meanings	0.43	0.41
		I search for evidence to support what I read	0.49	0.47
		I sing while reading to increase information memorization	0.41	0.39
		I replace the words found in the text with symbols	0.45	0.43
		I derive new formula for the terms and words found in the text	0.49	0.45
		I am attracted to words rythm when memorizing and I am not worried about their meanings	0.36	0.33
Concepts		I deal with the information found in the topic through direct relations between concepts	0.34	0.30
		I form new mental images for the concepts found in the text	0.47	0.39
		I care for organizing the most important information and concepts then the less important	0.40	0.36
		I formulate concepts and basic statments in my own style	0.35	0.29
		I retreive information in a better way when a close concept to the one needed to be remembered is mentiond	0.36	0.33
		I find it difficult to correlate concepts	0.36	0.35
		I remember information and retrieve it by linking conceptstogether	0.57	0.53
		I replace the concepts in the text with symbols and marks	0.49	0.42
		I depend on the concept features when I am learning	0.44	0.32
		I compose consepts in my mind before writing them	0.42	0.39
		I find it difficult to conclude correlation factors between the concepts I study	0.49	0.42

As observed in table 2 the coefficients of items correlation with the dimensions measured scored high. Items scores range between (0.34-0.57), the total score range between (0.29-0.53). These results indicate that these items share in measuring one dimension expressed by the overall score.

10.2.3 Test Stability

To ensure the test stability the pilot sample was retested after an interval of two weeks. The author computed the data obtained from the test and retest using the Pearson spearman formula between the estimates of the respondents in the two times. The internal consistency was calculated using the Cronbach's Alpha formula to find the responses degrees in both times, results found were considered appropriate for this study, table 3 illustrates these results.

Table 3
Internal Consistency And Repetition Stability Of The Domains And Overall Test

Domain	Repetition stability	Internal consistency
mental processes	0.82	0.81
Concepts	0.84	0.84
symbolic systems	0.81	0.85
Overall	0.84	0.87

Correcting the Test

The final version of the test included 34 items allocated to three dimensions (mental processes, concepts and symbolic systems), the participants selected based on their certainty the answer on each item from a 5-point Likert scale ranging from (5) "strongly applies", (4) "applies", (3) "somewhat applies", (2) "does not apply" and (1) "strongly doesn't apply". The overall degree range between 34 as the lowest degree and 170 as the highest degree obtained by the respondent.

11. PROCEDURES

The author determined the study sample using the simple random sampling method from female students enrolled in scientific and humanitarian majors at Qassim University. The participants completed the test of

knowledge acquisition. The same test was implemented on the students enrolled in the third and seventh semesters to find the amount of knowledge transformation between the two categories. Results obtained were analyzed and discussed.

12. STATISTICAL CRITERION

A 5-point Likert scale was adopted to answer the test items, it ranged from (5) "strongly applies", (4) "applies", (3) "somewhat applies", (2) "does not apply" and (1) "strongly doesn't apply". The low score range (1.00-2.33), the intermediate score range (2.34-3.67), and the high score range (3.68-5.00). The used formula to calculate the results:

$$\frac{\textit{the highest score}(5)\text{-}\textit{the lowest score}(1)}{\textit{the number of categories}(3)}$$

$$\frac{5\text{-}1}{3}=1.33$$

Then this result was added to the end of each category.

To answer the first question of "What is the level of knowledge acquisition among the students of Qassim University?" means and standard deviations of the knowledge acquisition level among Qassim female students were calculated as illustrated in table 4.

Table 4
Means and Standard Deviations of Knowledge Acquisition Level Among Qassim Students in a Descending Order Based on Their Means

Rank	No.	Dimension	Mean	SD.	Level
1	1	mental processes	3.50	.723	Intermediate
2	2	Concepts	3.30	.772	Intermediate
3	3	symbolic systems	3.11	.880	Intermediate
		Overall	3.30	.773	Intermediate

As noticed in table 4 means range between (3.11-3.50), the mental processes ranked first and scored the highest mean (3.50), the lowest mean was scored by the symbolic systems (3.11), it was ranked last, and the overall mean scored (3.30). The overall mean of the knowledge acquisition level was intermediate. This result may be attributed to the student's intermediate knowledge acquisition efficacy level, students encounter many Stimuli, which helps in the cognitive structure formation, students acquire mental schemes by experimenting events and communicating with others, these schemes start as simple structures then develop into complex structures that include dynamic, social, emotional and cognitive aspects through lifetime stages. After finishing their earlier educational stages students form schemes and complex cognitive structures that give them the ability to correlate concepts mentally and explain information received from the environment. Means and standard deviations of the participant's responses estimated on each dimension are illustrated in the following tables:

(a) Mental Processes

Table 5
Means and Standard Deviations of the Mental Processes Level Among Qassim Students in a Descending Order Based on the Means

Rank	No.	Items	Mean	SD.	Level
1	5	I use figures and lines when I compare information	3.69	.887	High
2	10	I use models and tangible material as helpers in the process of remembering	3.67	.892	Intermediate
3	9	I draw to solve spelling issues	3.58	.949	Intermediate
4	3	I draw illustrative forms or graphic maps when I try to understand my subjects	3.57	.950	Intermediate
5	6	I depend on what I have in my mind from former knowledge while receiving new knowledge	3.56	.977	Intermediate
6	7	I correlate the theoretical and applied while studying	3.50	.979	Intermediate
7	8	I translate the text while explained in tables and figures	3.49	.979	Intermediate
8	4	I compare different information then I transfer them into images and figures	3.43	1.018	Intermediate
9	2	I classify images and drawings then I correlate between them	3.28	.989	Intermediate
10	1	I use images and illustrations while comparing information	3.21	.978	Intermediate
		Mental processes	3.50	.723	Intermediate

In table 5 it is observed that means range between (3.21-3.69), item number 5 "I use figures and lines when I compare information" ranked first (M=3.69), while item number 1 "I use images and illustrations while comparing information" ranked last (M=3.21). The mental processes overall mean score was (M=3.50).

This result may be explained by the fact that using mental processes enhances the level of knowledge acquisition and improves the academic achievement. The process of knowledge acquisition is complex, so students use figures and lines when comparing information more than using images and illustrations because images and

illustrations are more complex. However, it is apparent that mental processes strategies enable students to be aware of the information received and to assimilate what is more convenient with the cognitive system as a whole, which increases the ability of knowledge acquisition.

(b) Symbolic Systems

Table 6
Means and Standard Deviations of the Symbolic Systems Items Among Qassim Students in a Descending Order Based on the Means

Rank	No.	Items	M.	SD.	Level
1	12	I recognize mathematical formula while reading a mathematical text	3.55	.951	Intermediate
2	13	I derive data after reading a mathematical text	3.54	.952	Intermediate
3	8	I use symbols and figures when I answer	3.46	.888	Intermediate
3	11	I define the farest mathematical relationships included in the text	3.46	.916	Intermediate
5	10	I read mathematical texts in the right manner	3.45	.934	Intermediate
6	7	I infere new meanings for the context	3.42	.922	Intermediate
7	3	I extract the text meaning and correlate it with what I have in my memory	3.39	1.007	Intermediate
8	5	I combine the text words to produce new meanings	3.27	1.069	Intermediate
9	4	I search for evidence to support what I read	3.23	1.025	Intermediate
10	2	I sing while reading to increase information memorization	3.21	.978	Intermediate
11	9	I replace the words found in the text with symbols	3.10	1.088	Intermediate
12	6	I derive new formula for the terms and words found in the text	3.02	1.077	Intermediate
13	1	I am attracted to words rhythm when memorizing and I am not worried about their meanings	2.76	.996	Intermediate
		Concepts	3.30	.772	Intermediate

As observed in table 6, means range between (2.76-3.55), item number 12 "I recognize mathematical formula while reading a mathematical text" was ranked first and scored a mean of (3.55), while the first item "I am attracted to words rhythm when memorizing and I am not worried about their meanings" ranked the last and scored a mean of (2.76) degree. The overall mean of the concept dimension scored (3.30) degrees.

This result is explained by the fact that the students has the ability to process and transform received knowledge from its mere form, whether it was symbolic such as words and mathematical symbols or derivatives such as meanings by correlations, differentiations, and integration to link it with the existing cognitive structures they have to become a part of it.

(c) Concepts

Table 7
Means and Standard Deviations of the Concepts Items in a Descending Order Based on Their Means

Rank	No.	Items	Mean	SD.	Level
1	5	I deal with the information found in the topic through direct relations between concepts	3.26	1.111	Intermediate
2	4	I form new mental images for the concepts found in the text	3.23	1.075	Intermediate
3	9	I care for organizing the most important information and concepts then the less important	3.20	1.009	Intermediate
4	11	I formulate concepts and basic statments in my own style	3.18	1.073	Intermediate
5	1	I retreive information in a better way when a close concept to the one needed to be remembered is mentiond	3.15	1.034	Intermediate
5	10	I find it difficult to correlate concepts	3.15	1.150	Intermediate
7	3	I remember information and retrieve it by linking conceptstogether	3.14	1.040	Intermediate
8	6	I replace the concepts in the text with symbols and marks	3.07	1.035	Intermediate
9	7	I depend on the concept features when I am learning	3.04	1.155	Intermediate
10	8	I compose consepts in my mind before writing them	2.95	1.028	Intermediate
11	2	I find it difficult to conclude correlation factors between the concepts I study	2.88	1.112	Intermediate
		Concepts	3.11	.880	Intermediate

As seen in table 7, the means range between (2.88-3.26), item "I deal with the information found in the topic through direct relations between concepts" in the first rank and scored means of (3.26), while item "I find it difficult to conclude correlation factors between the concepts I study" came in the last rank and scored a means of (2.88). The overall mean of the concept dimension scored (3.11).

This result may be explained by the fact that knowledge acquisition starts naturally through a number of few simple mental processes that combine together a hierarchal chain that leads to correlating concepts together, for that students find it easy to deal with direct relations and difficult to correlate concepts together.

To answer the second question of "Are there significant differences at (α=0.05) between means of participants responses on the knowledge acquisition test attributed to the type of the major (scientific or humanitarian), academic level (third or seventh semester) and their interaction?"

means and standard deviations of the knowledge acquisition test level among Qassim university students based on the major and academic level and the interaction between them was calculated as seen in table 8.

Table 8
Means and Standard Deviations of Knowledge Acquisition Level Based on Major and Academic Level and Their Interaction

Academic level	Major	M.	SD.	No.
Third semester	Scientific	3.58	.120	30
	Humaneterian	2.37	.167	30
	Overall	2.98	.626	60
Seventh semester	Scientific	4.38	.102	30
	Humaneterian	2.85	.115	30
	Overall	3.61	.779	60
Overall	Scientific	3.98	.417	60
	Humaneterian	2.61	.278	60
	Overall	3.30	.773	120

As inferred from table 8, apparent differences in means and standard deviations of knowledge acquisition level based on major and academic level and their interaction among Qassim University students were found. To find the significance of these differences a two-way analysis of variance is computed as seen in table 9.

Table 9
Two-way Analysis of Variance of the Impact of Major Type and Academic Level and Their Interaction on the Level Of Knowledge Acquisition Among Qassim University Students

Variance source	Sum of squares	Freedom degree	Means squares	F value	Sign.
Academic level	12.125	1	12.125	735.554	.000
Major	56.238	1	56.238	3411.658	.000
Academic level × Major	.781	1	.781	47.362	.000
Error	1.912	116	.016		
Overall	71.056	119			

From table 9, it is noticed that the academic level effect at (α=0.05) is significant, f-value scored (735.554) and a significance of (0.000), the differences were in favor of the seventh academic students. The differences of major effect was also significant at (α=0.05), f-value scored (3411.658) and a significance of (0.000), the differences were in favor of scientific majors. The differences of interaction between major and academic level effect was significant at (α=0.05), figure 1 illustrates the differences between the means.

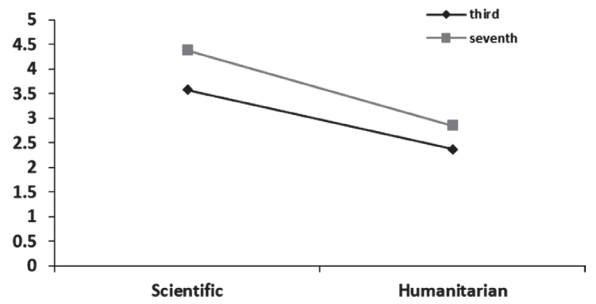

Figure 1
Illustrative Chart of the Interaction Between Major and Academic Level Effect on Knowledge Acquisition

The interaction between the major and academic level as seen in the chart is in favor of the seventh level in both majors. This result may be explained by the fact that the scientific majors construct a more comprehensive knowledge. That means the learner understands the components of the topic and defines the proper mental processes and uses symbolic systems and imagines the correlations of the different concepts, which makes students more able to express the mental structure, which reflects the level of complexity in knowledge acquisition.

Knowledge increase appears in its complex levels. Cognitive psychology advocates believe that there is a self-organizer in the cognitive structure of the learner; its task is to organize knowledge acquisition in a hierarchal method that has its own private constructs (Pintrich et al., 1993). This constitutes a prominent role in understanding scientific concepts in different majors.

13. IMPLICATIONS

In light of the findings the author recommends;

Teachers to give students the opportunity to use the skills of knowledge acquisition, by that they become more aware of their mental processes, and give feedback about the extent of their goal achievement by controlling the methods they use in knowledge acquisition.

Responsible institution are recommended to revise curricula content and topics in order to make them more attractive for the students and more stimulating, doing that helps students to adopt cognitive methods to understand materials better.

Educational institutions are recommended to utilize modern techniques in teaching methods and to care for developing courses to keep in pace with scientific and cognitive growth occurring lately.

REFERENCES

Aharchaou, al-Ghali. (1999). The process of acquisition between cognitive growth and learning. *Arab Childhood Journal*, (1). Kuwait.

Aharchaou, al-Ghali. (2007). Towards cognitive approaches of child psychology and acquisition process in the Arab world. *Arab Childhood Journal*, (35), 98-107.

Aharchaou, al-Ghali. al-Zaher, A. (2000). Unit of formation and research: Cognitive growth and Process Of acquirement of the Knowledge. *University of Bahrain Journal, 1*(1). 16-45.

Carey, S. (1985). *Conceptual change in childhood.* Mass MIT Press.

Chomsky, N. (1968). *Language and mind.* NY: Harcourt Brace Javanovitch.

Greenfield, P. M., & Bruner, J. S. (1966). Culture and cognitive growth1. *International Journal of Psychology, 1*(2), 89-107.

Hull, C. (1952). *A behavior system.* New Haven: Yale University Press.

Mounoud, P. (1994). *The emergence of new behaviors: Relations between knowledge in psychology and education*. N18.

Osgood, C. (1953). *Method and theory in experimental psychology.* NY: Oxford Uni. Press.

Pankratius, W. J. (1990). Building an organized knowledge base: Concept mapping and achievement in secondary school physics. *Journal of Research in Science Teaching. 27*(4). 315-333.

Piaget, J. (1974). Six psychology studies, ed Denoele Paris.

Pintrich, P. M., etc. (1993). Beyond cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research, 63*(2). 167-199.

Shalabi, M. (2001). *An introduction into cognitive psychology.* Dar El Ghareeb For Printing & Publishing. Cairo. Egypt.

Skinner, B. (1971). *Analyse comportementale expérimentale.* Bruxelles, Desart.

Thorndike, P. (1977). Cognitive structure in comprehension and memory for narrative discourse. *Cognitive Psychology, 9*, 77-110.

Vygotsky, L. (1962). *Thought and language.* New York: John Wiley and Sons.

Vygotsky, L. (1980).*Thought and language; ed social trad*. Franc; Paris