

Effectiveness of the conceptual maps strategy to develop a critical thinking in the educational process in the schools of Kuwait (Case Study: Kuwaiti Ministry of Education)

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Abstract

This study aimed to measure the effectiveness of learning methods and means of modern learning, including conceptual maps on the development of critical thinking among students in the seventh grade of intermediate stage in the city of Kuwait, and the researcher applying this study on a stratified sample consisting of (100) students from males in the intermediate school Saud Al Kharji in Kuwait City, the capital of the State of Kuwait. It have been using the most commonly used tests in the educational community, it is a test of (California) 2000 and test (Lepper) 2005, where the stratified sample was divided into two random samples were distributed to two different groups: first, applied the conceptual maps, and second group: applied the traditional way of learning. The results of this study proved that the ability of conceptual maps to develop the critical thinking among students involved in the study sample, and the results of this study substantially agree with previous studies.

Keyword: Kuwaiti Ministry of Education, conceptual maps, learning methods, critical thinking, test of (California) 2000, test (Lepper) 2005.

1. Introduction:

The work of conceptual maps based on arrangement the concepts and the relationships between them in the clear framework and hierarchical manner from the most general to the less public so that help students to understand these concepts, and learn the relationships between them, when reviewing the different definitions in the literature of the conceptual maps researchers differ in defining this concept; this is due to the different schools of thought and their multiplicity.

Critical thinking represents an individual's ability to estimate the reality of knowledge and accuracy in objective analysis, which means allegation or cybernetic in the light of the evidence which is supported to reach sound conclusions in a logical and clear manner, instead of jumping to the results.

The critical thinking and development of learners the most prominent types of thinking which seeks to recent studies in education; due to his role in preparing learners to meet the challenges and problems faced by the communities as a result of rapid changes and developments that have been affected by all areas of contemporary life and its manifestations, since it is based on evaluate information faced by the individual in the rational use of reflective thinking which is based on the clarity of meaning provided by the individual about what people think or do them.

Several studies conducted on the development of critical thinking skills and its impact on the achievement, have researchers were able see the number of them: a study of (Lumpkin, 1992) in the United States, the study (Zyadat, 2003), which aimed to investigate the effect of using a strategy of teaching over the cognitive model investigative achievement and the development of critical thinking among the students of ninth grade in the study of geographic in Jordan, and the current study has benefited from previous studies by reference to the theoretical literature in those studies, and through the identification problem of the study, design of the tool, the explain of the purpose of the study and its community appointed, and to identify variables .

2. The Study Problem

The problem of this study is the need to search in the possibility to benefit from the strategy of conceptual maps in the development of critical thinking through the application of this strategy in the teaching of science topic to students, and search into its impact compared to traditional methods in the development of critical thinking, so the current study will work on the construction of an educational model to be applied in teaching a unit of study will determine later from science topic based strategy conceptual maps and its application in the teaching of science to seventh graders in the State of Kuwait in order to develop critical thinking, and search at the effectiveness of this strategy in the development of critical thinking among a random sample of students from the seventh grade in the state Kuwait.

3. The Study Importance

The importance of this study can appear through the following:

3.1. The current study are different from previous studies that were limited to the application of Traditional strategy and look for its impact in a number of independent variables, which are including many skill, where this study will work on the application of conceptual maps strategy and look for on its impact on the development of the critical thinking skill, where it will looking at the impact of two models of education, one based on the strategy of conceptual maps and the second is based on a strategy of learning the traditional teaching of science in order to develop the skill of critical thinking among a sample of students from the seventh grade, where the majority of studies based on traditional strategic and look for into its impact on the development of the skill of the students.

3.2. The current study will increase from the previous studies on the activation of more than one theory of modern learning and strategies within the educational institutions of Kuwait through the application of conceptual maps strategy in teaching science to seventh grade and look for at the effectiveness of this strategies in the development of critical thinking and achievement and motivation among a sample of students Kuwait.

3.3. Apply this educational strategy in the current study Aims to raise the level of critical thinking, motivation and achievement among students with taking advantage of the concepts of a group from global strategies like conceptual maps, which extends the school curricula by ways of modern learning strategies it can be utilized in the development of these approaches, if proven effective.

4. The Study Objective

The current study aims to apply the following points:

4.1. Application of conceptual maps strategy in teaching a unit of study of science for a sample of seventh grade students in the State of Kuwait.

4.2. Search in the effectiveness of conceptual maps strategy in the development of critical thinking and achievement among a sample of seventh graders in the State of Kuwait.

4.3. Take advantage according to the recommendations in the light of the results from current study may be benefit to scientific research in this regards.

5. The Study Hypotheses:

According to the objective this study, the researcher formulation the follows Hypotheses:

5.1. There are **No** statistically significant differences at the level of significance ($\alpha \leq 0.05$) in critical thinking among students in the seventh grade in Kuwait, according to the conceptual maps teaching strategy.

5.2. There are **No** statistically significant differences at the level of significance ($\alpha \leq 0.05$) in critical thinking among students in the seventh grade in Kuwait, according to the traditional ways teaching strategy.

6. The Terminology of this study:

6.1. Conceptual maps: A concept map is a diagram that depicts suggested relationships between concepts. It is a graphical tool that designers, engineers, technical writers, and others use to organize and structure knowledge, a concept map typically represents ideas and information as boxes or circles, which it connects with labeled arrows in a downward-branching hierarchical structure. The relationship between concepts can be articulated in linking phrases such as causes, requires, or contributes to.

6.2. Critical thinking: A Critical thinking is the study of clear and unclear thinking. The National Council for Excellence in Critical Thinking defines critical thinking as the intellectually disciplined process of actively and skill fully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. Thinking about one's thinking in a manner designed to organize and clarify, raise the efficiency of, and recognize errors and biases in one's own thinking. Critical thinking is not 'hard' thinking nor is it directed at solving problems (other than 'improving' one's own thinking). Critical thinking is inward-directed with the intent of maximizing the rationality of the thinker. One does not use critical thinking to solve problems - one uses critical thinking to improve one's process of thinking.

7. Literature Review:

7.1. The effect of concept mapping on students' learning achievements and interests, Chei-Chang Chiou, *Innovations in Education and Teaching International* Vol. 45, No. 4, November 2008, 375–387:

The study described in this paper has examined whether concept mapping can be used to help students to improve their learning achievement and interests. The participants were 124 students from two classes enrolled in an advanced accounting course at the School of Management of a university in Taiwan. The experimental data revealed two important results. First, adopting a concept mapping strategy can significantly improve students' learning achievement compared to using a traditional expository teaching method. Second, most of the students were satisfied with using concept mapping in an advanced accounting course. They indicated that concept mapping can help them to understand, integrate and clarify accounting concepts and also enhance their interests in learning accounting. They also thought that concept mapping could be usefully used in other curriculum areas.

7.2. Effect of Concept Mapping On Students' Academic Achievement, Ahmad Bilal Cheema, Munawar S. Mirza, *Journal of Research and Reflections in Education*, December 2013, Vol.7, No.2, pp 125 -132:

The study aimed to analyze effect of concept mapping, a constructivism based learning strategy, on academic performance of 7th grade students in the subject of general science. This quasi experimental research, based on 2x2 factorial research designs, involved 167 students from two single sex schools. Major objectives of the study were to; (i) find out the effect of concept mapping as a learning strategy on the academic achievement of students (ii) study differential effect of concept mapping on academic achievement of male and female students (iii) to find out the interaction effect of concept mapping as a learning strategy and gender on students' academic achievement. Researchers developed achievement test was used as pre test and post test. During the treatment of five months, experimental group was trained to develop concept maps for three weeks. Subsequently students developed concept maps of general science content individually, shared those in groups and were compared by teacher with scientifically accepted concept maps for possible correction and improvement. Data on gain achievement scores were analyzed through 2-way ANOVA. Results showed that the male and female students taught through concept mapping performed better than the students taught through traditional teaching method. However male students taught through concept mapping performed significantly better than the female students. It is therefore recommended that concept mapping should be used in elementary classes for teaching general science. Concepts maps may also be incorporated in the textbooks of science subjects at the school level.

7.3. EFFECT OF CONCEPT-MAPPING IN SCIENCE ON SCIENCE ACHIEVEMENT, COGNITIVE SKILLS AND ATTITUDE OF STUDENTS, Dr. Manjula P Rao, *Regional Institute of Education, Mysore, India.*,2007:

The analysis of data revealed that the experimental group students had performed better when compared to the control group on the achievement test, process skills and concept attainment test on the post test occasion. This was evidenced through the "t" values obtained for achievement test (9.66); process skills (6.34) and the concept attainment test (4.40). The analysis of students (experimental) attitude towards concept mapping revealed that almost 90% of them had a very positive attitude. The F values obtained (5.921) showed that there is a difference between and within the different intelligence groups of the experimental group in their post-achievement test implying that the concept mapping strategy has had a differential effect on students belonging to different intelligence groups. Similarly, the F value obtained for concept attainment test was found significant implying that there is a difference within and between the students of different intelligence in their concept attainment ability. But there was no difference found either between or within the different grades of students in their performance of process skills. There was no difference observed between girls and boys in their achievement, process skills, concept attainment and in their attitude towards concept mapping. Based on the results of this study, it is concluded that there is a need to include concept mapping with the constructivist basis as one of the major approaches to teach science in schools and provide workable strategies to help students "learn how to learn".

7.4. The Effect of Using Concept Mapping in Teaching on the Achievement of Fifth Graders in Science, Ahmed O. Qarareh, *Educational Science Faculty, Tafilah University, Stud Home Comm Sci*, 4(3): 155-160 (2010):

The study investigates the effect of using the concept mapping strategy in teaching on the achievement of fifth graders in science. To achieve this goal, eighty students were randomly selected then divided in to two groups: - an experimental group was taught by using concept mapping, and control group was taught by traditional method. Data were collected using the following two instruments:-a number of teaching situations which planned by concept map and achievement scale of (25) items. To answer the questions of the study, analysis of variance

were used. The study shows that using the concept map shows greater effect on academic achievement. The researcher recommended that should be used the concept mapping in science teaching and more studies should be conducted about the effect of this method including other instructional variables.

7.5. The Effect of Concept Mapping Instructional Strategy on the Biology Achievement of Senior Secondary School Slow Learners, Uchenna Udeani and Philomena N. Okafor, Scholar link Research Institute Journals, 2012 (ISSN: 2141-6990):

The study investigated the comparative effectiveness of the expository and concept mapping instructional strategy of presenting secondary school biology concepts to slow learners. One hundred and twenty four biology slow learners were identified and randomly assigned to the expository group (n=62) and concept mapping group (n=62) and respectively taught the concept of photosynthesis. The groups were post-tested after two weeks of teaching for any significant differences in their biology achievement. Analysis of post-test scores indicated that the group taught by the concept mapping instructional strategy performed significantly ($p < 0.05$) better than their expository group counterparts. Specifically, female slow learners taught with the concept mapping instructional strategy performed significantly ($p < 0.05$) better than their male counterparts taught by the same method. These results have implications for biology teacher preparation, especially in the areas of teaching females and identifying slow learners and adopting effective methods of tackling their problems.

8. The study methodology

After the researcher familiarized them with the research and studies that dealt with concept maps and their impact on critical thinking he tried to take advantage of them as follows:

8.1. Population of the study: the population of this study included at (100) students in the preparatory stage, specifically in the seventh grade of material science, especially males in Kuwait City in Kuwait Saud Kharji middle school, and the following table shows the current members of the Population of the study and their characteristics:

Figure (1)

Community Members in the study which applied the study Distributors tow class

Content	Class (1)	Class (2)
No. of students	50	50
Total No.	100 students	

8.2. The Study Sample:

The researcher has been selected a random sample of the Population of the study the number of members (60) students from the School of Saud Kharji medium Benin for students of science in Kuwait City, which contains two classes of the seventh grade (thirty student were chosen from every class randomly from the same school for the application of this study), as the selection process has been the way the simple random divided as follows:

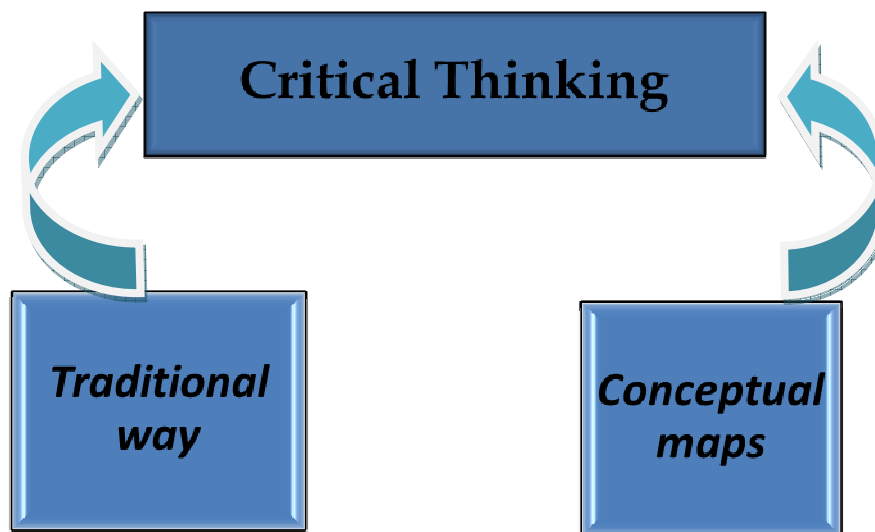
Figure (2): The sample of study

Content	Class (1)	Class (2)
No. of students	50	50
No. of sample selected	30	30
Total Samples	60 students	

8.3. The Study Model

According to the study hypotheses' the researcher derived the study model as follow: (the figure No. (3) Shows the model of this study):

Figure (3) The study model



From the figure above the researcher derived the mathematical model for this study as follow:

$$C.T = B_1 * C.M + B_3 * T.W + \bar{e}$$

Where:

C.T: Critical Thinking

C.M: Conceptual Maps

T.W: Traditional Way

\bar{e} : Random Error

9. Data Analysis:

9.1. The researcher has been verified the stability of the test in a repatriation manner in period of time two weeks and the sample (40) students from outside the research sample (another school seventh row material science) by calculates the Pearson correlation coefficient, as shown in Table No. (1).

Table (1)
Pearson correlation coefficient for California critical thinking skills test 2000

S.R	No. of Paragraphs	Skill	Stability coefficient
1	6	Analysis Skill	0.84
2	6	Induction Skill	0.83
3	4	Conclusion skill	0.73
4	12	Heuristics Skill	0.88
5	6	Assessment Skill	0.81
Total			0.86

9.2. Applying the test on the samples research

The test was applied to material science's students through group sessions according to the procedures applied as contained in using the guide the original image, where researcher oversaw to be applied to all members of the research samples.

It has been identified a standard 80% of take it as the level of educational acceptable level owning critical thinking skills to the test California Critical Thinking, based on the study of all of the Zyadat (1995), and Al - Massad (1997), and Afanah (1998), which identified the acceptable level educationally for critical thinking skills b (80%). With this level select all of Massad (1997), and Hamadneh (1995), and b Rabadi (60%).

9.3. Results test of California 2000 on a first sample which specialized the way of learning Conceptual Maps:

Figure (4)

Results of Test (T) for a sample to measure the significance of differences between the averages of the extent of owning the seventh-grade students to critical thinking skills to the test and the total of the five fields, and the arithmetic average of the level of educational accepted (80%)

Critical Thinking skill	No. of samples	Mean	Percentage	St.D deviation	Calculated - T	Sig*
Analysis Skill	30	7.57	%75.7	1.38	2.289	*0.026
Induction Skill	30	7.43	%74.3	1.31	3.150	*0.003
Conclusion skill	30	19.47	%69.5	2.64	8.066	*0.000
Heuristics Skill	30	16.77	%69.9	2.36	7.489	*0.000
Assessment Skill	30	9.62	%64.0	2.12	8.151	*0.000
Total		60.87	%70.0	6.64	9.579	*0.000

9.4. Test hypotheses

9.4.1. The 1st hypotheses: There are **No** statistically significant differences at the level of significance ($\alpha \leq 0.05$) in critical thinking among students in the seventh grade in Kuwait, according to the conceptual maps teaching strategy.

The differences between the arithmetic mean of the extent of owning the seventh grade students for the Study of Science of the critical thinking skills to the total test, and the arithmetic mean of the level of educational accepted (80%) was statistically significant, as the value of t calculated the difference between the averages (9.579), a value statistically significant at the level of significance ($\alpha = 0.05$).

As well as the results indicate in the table above observed that disparities in the averages of the extent of owning seventh grade students for the Study of Science of critical thinking skills on the five areas and the arithmetic mean of the level of educational accepted (80%) were statistically significant, with values ranged T. calculated between (2.289) for the field (skill analysis) and (8.151) for the area (for skill assessment) and these values are statistically significant at the level of significance ($\alpha = 0.05$).

And in view of the table it is clear that the significance was for the benefit of the arithmetic mean of the level of acceptable educationally. In the sense that the extent of owning the seventh-grade students for the Study of Science of the critical thinking skills to the test and the total of the five fields is less than the acceptable level educationally.

9.4.2. The 2nd hypotheses: There are **No** statistically significant differences at the level of significance ($\alpha \leq 0.05$) in critical thinking among students in the seventh grade in Kuwait, according to the traditional ways teaching strategy.

The difference between the arithmetic mean of the extent of owning seventh grade students for the Study of Science of the critical thinking skills to the total test and the arithmetic mean of the level of educational accepted (80%) was statistically significant, as the value of t calculated the difference between the medium (10.579), a value statistically significant at the significance level ($\alpha = 0.05$).

As well as the results indicate in the table observed that disparities in the averages of the extent of owning seventh grade students for the Study of Science of critical thinking skills on the five areas and the arithmetic mean of the level of educational accepted (80%) were statistically significant, with values ranged (T) calculated between (3.289) to the field (for skill analysis) and (9.121) for the area (for skill assessment) and these values are statistically significant at the level of significance ($\alpha = 0.05$).

In view of the table it is clear that the significance was for the benefit of the arithmetic average of the sample search bunting, a second sample. In the sense that the extent of owning the seventh-grade students for the Study of Science of the critical thinking skills to the test and the total of the five fields is higher than the educationally acceptable level.

the achievement of student on average for the sample conceptual maps up to almost double the student achievement school in the control group, and this unexpected result for the fact that the researcher conceptual maps and educational tool proved their usefulness and validity in previous studies that touched her researcher in this study. Taking the exact proportion of the difference between the achievement of students in the sample of the conceptual maps and student achievement in the traditional group, we find that the ratio is (1: 1.5).

10. The Recommendation of this study:

After summarizing the above results, the researcher offers several recommendations, which believed to be useful for prospective researchers:

10.1. Applying this type of studies on another community respect to the highest level of education, like universities, and in the school curricula have more nature experimental, in the fact that students are naturally inclined to demo status more than the indoctrination.

10.2. Find more ways of teaching beyond the conceptual maps and the application of this type of studies it.

10.3. Find more variables may be more useful than a variable critical thinking.

10.4. Nothing wrong to apply this kind of studies on the same variables and the same level in several Arab countries to see the differences in the nature of teaching and the nature of these are students between countries.

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