Full Length Research Article

THE IMPACT OF CONSTRUCTIVISM LEARNING IN MATHEMATICS TEACHING ON ACADEMIC ACHIEVEMENT AND MATHEMATICAL THINKING AMONG STUDENTS IN A COLLEGE ALGEBRA COURSE FOR FIRST YEAR STUDENTS IN VOCATIONAL EDUCATION

*Salwa Mrayyan

Balqaa Applied University

ABSTRACT

The principles of constructivism, increasingly influential in the organization of classrooms and curricula in schools. The principles appeal to our modern views of learning and knowledge, but conflict with traditional academic practices. We need to reflect on our practice in order to apply these ideas to our work. The current study as an attempt to know the effect of using constructivism learning model as a teaching models based on the constructivism theory on academic achievement and mathematical reasoning outcomes. Constructivism is basically a theory based on observation and scientific study about how people learn. It says that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When we encounter something new, we have to reconcile it with our previous ideas and experience, maybe changing what we believe, or maybe discarding the new information as irrelevant. In any case, we are active creators of our own knowledge. To do this, we must ask questions, explore, and assess what we know.

INTRODUCTION

Mathematics has an important role in the real word, and the reality of mathematics curriculum and traditional teaching methods cannot achieve those sparkling goals adopted by educational institutions. Experts and interested in mathematics and methods of teaching and learning tried to make proposals and solutions to methods of teaching mathematics and mathematics curriculum problems, among those proposals workout and use different strategies and models of modern teaching based on modern theories of learning, In the classroom, the constructivist view of learning can point towards a number of different teaching practices. In the most general sense, it usually means encouraging students to use active techniques (experiments, real-world problem solving) to create more knowledge and then to reflect on and talk about what they are doing and how their understanding is changing. The teacher makes sure understands the students' pre-existing conceptions, and guides the activity to address them and then build on them. Constructivist teachers encourage students to constantly assess how the activity is helping them gain understanding.

*Corresponding author: Salwa Mrayyan
Balqaa Applied University

By questioning themselves and their strategies, students in the constructivist classroom ideally become "expert learners." This has given them ever-broadening tools to keep learning. With a well-planned classroom environment, the students learn how to learn. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities with which students formulate and test their ideas, draw conclusions and inferences, pool and convey their knowledge in a collaborative learning environment. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Always guided by the teacher, students construct their knowledge actively rather than just mechanically ingesting knowledge from the teacher or the textbook. The concept of constructivism has roots in classical antiquity, going back to Socrates's dialogues with his followers, in which he asked to direct questions that led his students to realize for themselves the weaknesses in their thinking. The Socratic dialogue is still an important tool in the way constructivist educators assess their students' learning and plan new learning experiences. Among the educators, philosophers, psychologists, and sociologists who have added new perspectives to constructivist learning theory and practice are Lev Vygotsky, Jerome Bruner and David Ausubel. Where Vygotsky introduced the social aspect of learning into constructivism. He defined the "zone of

proximal learning," according to which students solve problems beyond their actual developmental level (but within their level of potential development) under adult guidance or in collaboration with more capable peers. Bruner initiated curriculum change based on the notion that learning is an active, social process in which students construct new ideas or concepts based on their current knowledge. Constructivism, as perspective on education, is based on experiential learning through real life experience to construct and conditionalize knowledge. Where Jacqueline Grennon Brooks and Martin G. Brooks offers five key principles of constructivist learning theory. As guide the curriculum structure and lesson planning.

They put them in five guiding principle of constructivism Pose problems of emerging relevance to students, Structure is learning around primary concepts, Seek and value students' points of view, Adapt instruction to address student suppositions, and Assess student learning in the context of teaching. These are applicable at all levels and stages of learning. The ideas of constructivist learning, will develop personal versions of these principles. Constructivist learning benefits, students learn more, and enjoy learning more when they are actively involved, rather than passive listeners, Education works best when it concentrates on thinking and understanding, rather than on rote memorization. And concentrates on learning how to think and understand. In constructivist classrooms students create organizing principles that they can take with them to other learning settings, and gives students ownership of what they learn, since learning is based on students' questions and explorations, and often the students have a hand in designing the assessments as well. Constructivist assessment engages the students' initiatives and personal investments in their journals, research reports, physical models, and artistic representations.

Engaging the creative instincts develops students' abilities to express knowledge through a variety of ways. The students are also more likely to retain and transfer the new knowledge to real life, By grounding learning activities in an authentic, real-world context, as well as it stimulates and engages students to learn how to question things and to apply their natural curiosity to the world, and, Constructivism promotes social and, Communication skills by creating a classroom environment that emphasizes collaboration and exchange of ideas. Students must learn how to articulate their ideas clearly as well as to collaborate on tasks effectively by sharing in group projects. Students must therefore exchange ideas and so must learn to "negotiate" with others and to evaluate their contributions in a socially acceptable manner. This is essential to success in the real world, since they will always be exposed to a variety of experiences in which they will have to cooperate and navigate among the ideas of others.

The Study Goal

Determine the impact of using the constructivism learning model in teaching Geometry unit on the achievement and mathematical thinking among vocational Education students in Balqaa Applied University.

Problem of the study

Study the impact of the use of constructivist learning model in teaching Geometry unit of pre-calculus course on the achievement and mathematical thinking among vocational Education students in Balqaa Applied University.

The study hypotheses

- No statistically significant differences between the average grades of experimental and control groups in the achievement posttest as a whole (remembering, understanding)
- No statistically significant differences between the average grades of experimental and control groups in the post application to measure the phenomenon of mathematical thinking as a whole (deduction, induction mathematical expression (symbolism)logical thinking. and mathematical proof)
- There is no correlation of statistical significance between the scores of the study sample in the achievement test and posttest of mathematical thinking.

Importance of the study

The current study is a response to what recommended by some studies and currently advocated by the educators of the need for a modern educational trend in teaching and experimenting with ways of teaching models and may lead to positive results in the educational process. This study is trying to activate the constructivist learning model and determine the features and application stages, providing a theoretical framework and a procedural guide for the mathematics prof. in a college level to teach geometry unit and mathematics in general according to the phases of the structural model theory. The current study may be useful in drawing the attention of those in charge of the educational process- especially involved in the education and learning of mathematics to some of the strategies and models suitable for modern teaching and learning of mathematics education in a college level , and access to to activate the constructivist learning model and determine the features and application stages, providing a theoretical framework and a procedural guide for the teacher to teach geometry unit at any stage according to the phases of the structural model theory. Also the current study is trying to activate the constructivist learning model and determine the features and application stages, providing a theoretical framework and a procedural guide for the teacher to teach geometry unit according to the phases of the structural model theory.

Objectives of the study

The study aims to achieve the following:

- Identify the impact of the use of constructivist learning model in teaching geometry unit of a pre-calculus course on academic achievement among students in the first year students in vocational education compared to the traditional method.
- Understand the impact of the use of constructivist learning model in teaching geometry unit of a pre-calculus course on mathematical thinking among students in the first year vocational education students in compared to the traditional method.
- Determine the type and the relationship between achievement and mathematical thinking among the Study sample.

Study Limitations

Application of the study was limited to a sample of Balqa Applied University students in Vocational Education conducted to geometry unit of a pre-calculus for the first year students in vocational education for the first semester 2010/2011. Measuring students' achievement on the first and second levels (remember "knowledge" understanding levels of the cognitive domain by expanded form (An Expanded Model) for Wilson, and Testing of mathematical thinking is limited to measuring some aspects of mathematical thinking among students (generalization, induction, deduction, symbolisms, logical thinking, and mathematical proof. The study hypotheses were tested at a level of significance (0.05).

The Theoretical Framework and Previous Studies

Terms of the study

Constructivism learning model

Maximos (2003, 55) Defined model of constructivism learning as: "Form to help students build their understanding a scientific knowledge according to four stages of the learning cycle. Emphasizes form on linking science, technology and society, built the four stages as ways of learning and working under specialists in science or technology, and what is in the mind of the learner when building scientific concepts of in accordance with the philosophy of constructivism, the four phases of the model are: Call and exploration, proposing solutions and interpretations, implementation, which is a phase or stage of action", The Researcher reformed the definition of constructivism as: A models teach in stemming from the constructivism theory, for making the learner center of the educational process, stresses on the interaction between the teacher and the learner, the cooperation of the educated among themselves in the classroom, applying the model according to four sequential phases: call, exploration , discovery and innovation, propose explanations and solutions, as the action stage (an application)

(Mrayyan 2005) Defines academic achievement or performance is the outcome of education to the extent to which a student, teacher or institution has achieved their educational goals. (Mrayyan 2005) Define mathematical thinking as: mental process or special mathematical activities includes a set of features are: generalization, induction, deduction, Coding, logical thinking, proof, and supports every aspect of these features on a range of mathematical abilities, skills, and mathematical thinking procedurally known as: the total score obtained by the student in the post application to measure mathematical reasoning used in the study.

Constructivist Theory

International Dictionary of Education (IDE, 1977, 701) define constructivism as" the theory of learning and growth of the child that he is active in the construction of "his own thinking patterns as a result of the interaction of innate abilities with experience. "School of Education at the University of Colorado (1998, 4013) and Faiza Hamada (2005) define it as: "the philosophy of learning based on the assumption that we are building our understanding of the world in which we live based on our experiences." Constructivist theory is based on

the idea that the student is an active learner by nature and able to create an environment of knowledge by linking it receives new information with his previous knowledge.

Learning

There is a set of assumptions reflecting the Constructivist theory features in cognitive learning, such as Learning process is active and ongoing structural and object-oriented, concepts or content includes the following: constructivism learning process from the perspective of structural enable learners to build new ideas and innovations through past experience, and has the structures in the structure of knowledge, interact past experience with new, organizes and explains his experiences with the world or reality around him, learning in the light constructivist theory is not a cumulative process mechanism for the knowledge unit, but it is a process of knowledge innovation. Learning is an active process. learning is not structurally unless it is active, and learning is active, when the formation of meanings when the learner psychological process is active requires mental effort, i.e., That learning is the responsibility of the learner and not the responsibility of the teacher, but learning activity among followers of constructivist theory has meaning Specifically, there are cases where that may be of learning where the learner is active, such as programmed education, but constructivists do not consider this activity, as the activity of the learner here gave him a ride to his specific knowledge already in the program.

To be learning structurally and active since there must be a purpose or goals, the learner is trying to achieve, to assist in solving the problem faced, or answer questions puzzling to him, or satisfy an internal desire to learn the subject, and obviously from the principle of object- constructivism learning the importance of identifying the purposes and objectives of learning about the life reality of the learner's interests and needs to give the learner a real problem or task to create the best conditions for learning: according to(Wheatley, 1991, 13) this type of learning helps students to build a sense of what they learn and develop their confidence in their ability to solve problems, and it is clear that this assumption emphasizes the importance of learning based problem solving asone of the types of learning that helps learners to understand what they are learning, and that have meaning for them, and followers of constructivist theory emphasizes the importance of the tasks of learning problems or learning any real relationship with the learner's life experiences so that learners see the relevance of this knowledge to their lives.

The process of learning to rebuild the knowledge of the individual through the process of social interaction with others, Learner builds knowledge through the activities of his own and that have special meaning in his mind, through discussion and dialogue about these meanings with others in a collaborative environment, the process of discussing and negotiating the learners among them may lead to access to the same meaning to everyone, but this does not eliminate the individual differences among them, The involvement of students in the construction of a specific meaning to each of them does not necessarily mean that they have come to the same meaning, and this meaning the joint is adjusted with each of them through the exercise of the activities and tasks. Prior knowledge of the learner is a prerequisite for building a sense of learning .Philosophy of constructivist theory to confirm the

prior knowledge of the learner and considers it a prerequisite for the meaning construction, interaction between the learner's knowledge of the new and previous knowledge one of the basic components in the process of learning sense, and this knowledge is considered as crossing bridge from which new knowledge to the learner's brain, but they may be on the contrary, it shall be as a hurdle or a barrier that prevents the passage of new information and prevents access to the mind of the learner, and be so in the case of non-possession of the learner's prior knowledge through which connect new knowledge, or in the case of prior knowledge is incorrect, and known the phenomenon of wrong concepts. The ultimate goal of the learning process makes adaptations copes with the pressure exerted on the cognitive experience of the individual. This is similar to the assumption of a physical adaptation carried out by the man to adapt the environmental pressures for survival, constructivist theory assumes that the individual (learner) must be adapted to the pressures of knowledge that are exposed, and the pressures of knowledge as defined by (Zaytoon 2003, 105) as: "All What happens as a case of cognitive disorder of an individual as a result of exposure to new experience cognitive structure of the individual to strongly resist any change is on them, which requires that the individual making a big effort to correct the cognitive structure:

Cognitive structure consisting of the learner resist changes dramatically, learner clings to his former knowledge with sometimes may be incorrect, because they offer explanations seem convincing him in connection with the data of experience, and this resistance requires the teacher also Direct them Ismail (2000, p 299) interest in the selection of many activities that confirm the accuracy of the data and experience show error in understanding if it exists of the learner. People learn to learn as they learn: learning consists both of constructing meaning and constructing meaning involves language: the language we use influences learning. On the empirical level. Researchers have noted that people talk to themselves as they learn. On a more general level. There is a collection of arguments, presented most forcefully by Vigotsky, that language and learning are inextricably intertwined. Learning is a social activity, our learning is intimately associated with our connection with other human beings, our teachers, our peers, our family as well as casual acquaintances, including the people before us or next to us at the exhibit.

We are more likely to be successful in our efforts to educate if we recognize this principle rather than try to avoid it. Much of traditional education, as Dewey pointed out, is directed towards isolating the learner from all social interaction, and towards seeing education as a one-to-one relationship between the learner and the objective material to be learned. In contrast, progressive education (to continue to use Dewey's formulation) recognizes the social aspect of learning and uses conversation, interaction with others, and the application of knowledge as an integral aspect of learning. (Resnick and Klopfer, 1989). Learning is contextual not isolated facts and some abstract theories in mind separate from the rest of our lives, we learn to relate to what we know to, what we believe, our prejudgments and our fears. (Teacher, 1962) On reflection, It becomes clear that this point is actually a corollary of the idea that is active and social learning. We cannot separate our

learning from our lives. (Vigotsky, 1978). One needs knowledge to learn. it is not possible to assimilate new knowledge without having some structure developed from previous knowledge to build on the more we know, the more we can learn, therefore, any effort to teach must be connected to the state of the learner, must provide a path into the subject for the learner based on that learner's previous knowledge takes time to learn, learning is not instantaneous, for significant learning we need to revisit ideas, ponder them try them out, play with them and use them. This cannot happen in the 5-10 minutes usually spent in a gallery (and certainly not in the few seconds usually spent anticipating a single institution object.) if one reflects on anything he have learned, soon realize that it is the product of repeated exposure and thought. Even, or especially, moments of profound insight, can be traced back to longer periods of preparation. Motivation is a key component in learning, not only is it the case that motivation helps learning, it is essential for learning, the ideas of motivation as described here is broadly conceived to include an understanding of ways in which the knowledge can be used, unless we know "the reasons why".

Constructivism

A reaction to didactic approaches such as behaviorism and programmed instruction, constructivism states that learning is an active, contextualized process of constructing knowledge rather than acquiring it. Knowledge is constructed based on personal experiences and hypotheses of the environment. Learners continuously test these hypotheses through social negation, each person has a different interpretation and construction of knowledge process. The learner is not a blank slate, but brings past experiences and cultural factors to a situation. A common misunderstanding regarding constructivism is that instructors should never tell students anything directly but, instead, should always allow them to construct knowledge for themselves, this is actually confusing a theory of pedagogy (teaching) with a theory of knowing. Constructivism assumes that all knowledge is constructed from the learner's previous knowledge, regardless of how one is taught. Thus, even listening to a lecture involves active attempts to construct new knowledge

Cognitive learning Assumptions

There is a set of assumptions reflecting the features of the constructivism theory in cognitive learning, and these assumptions are, learning process constructivism active and continuous object-oriented, and this includes the assumption of concepts or the following contents learning process constructions, learning from the perspective of constructivism can the learner to build ideas and new innovations through his experiences earlier, and of his compositions in the structure of knowledge Activity learning Builders also Zaytoon and zaytoon (2003, p 98) has a special meaning, as there are pictures of learning may be the learner where active such as education programmed but, do not consider this activity does not mean actively learning this type of activity, as the activity learner here give him a ride to his specific knowledge already in the program. learning process of object-oriented: learning active for there must be a purpose or goals seeks learner to achieve, help in solving the problem faced or answer questions puzzling to him or satisfy a tendency self-interior has about

learning a subject, is evident from the principle of object-learning the importance of identifying learning objectives and purposes of the reality of the life of the learner and the interests and needs. Wheatley (Wheatley, 1991, 13) that this type of learning helps students to build a sense of what they learn and develop their confidence in their ability to solve problems, and it is clear that this assumption emphasizes the importance of learning based on problem solving as one of the types of learning that helps learners to understand what they are learning, and that have meaning for them, The constructivist also emphasizes the importance of the learning tasks or learning any problems related real life experience of the learner so that learners see the relationship of this knowledge to their lives.

Prior knowledge of the learner is a prerequisite for building meaningful learning Philosophy emphasizes of building on the learner's knowledge and considers it a prerequisite to build a sense, the interaction between the learner's knowledge of new and knowledge of the past is one of the important components in the meaningful learning process, and this knowledge is considered to be the bridge that cross from which new knowledge to the mind of the learner, but they may be on the contrary it shall be an obstacle or barrier that prevents the passage of new knowledge and prevents access to the mind of the learner, and be so in the case of non-possession of the learner's knowledge of the previous through which connect new knowledge by, or in the case of knowledge incorrect, and know this phenomenon concepts is wrong. The ultimate goal of the learning process make adaptations aligned with the cognitive pressures on the experience of the individual practice:

Piaget and the constructivism theory

Constructivism theory has in ancient roots observed when many philosophers and educators, Swiss psychologist Jean (1896-1980) laying the foundations of constructivism as a theory in cognitive learning , theory of Piaget in cognitive learning represent the general framework or the general features of the perspective of structural psychological for knowledge and acquisition, and Jean Jean-Jacques (2001, 188) that although the roots Constructivism can be traced to the philosopher Vico ", but looking at it as a whole in terms of originality and multi-disciplinary efforts emerged in biology and logic, psychology and sociology, Piaget without a doubt is the center illustrious which launched differences ,Piaget has put the theory of an integrated and unique about cognitive development in children, but this theory is twofold essential interrelated called one inevitable logical "Logical Determinism", and specializes assumptions Piaget for logical operations and by making such stages of mental development of the child based on those processes, and called on the other side of the theory of Piaget in cognitive development constructivism

Cognitive Development

In various stages of growth Revolve around how to build an individual to Know Logical determinism "Piaget's work on children's intellectual development owed much to his earlier Studies of water snails" (Satterly, 1987:622) His view of how children's minds work and develop has been enormously

influential, particularly in educational theory. His particular insight was the role of maturation (simply growing up) in children's increasing capacity to understand their world they cannot undertake certain tasks until they are psychologically mature enough to do so. His research has spawned a great deal much of which has undermined the detail of his own, but like many other original investigators, his importance comes from his overall vision. Adaptation is adapting to the world through assimilation and accommodation. Assimilation is the process by which a person takes the material into their mind from the environment, which may mean changing the evidence of their senses to make it fit. Accommodation is the difference made to one's mind or concepts of the process of assimilation. Note that assimilation and accommodation go together. You can't have one without the other.

Classification is the ability to group objects together on the basis of common features Class inclusion. The understanding, more advanced than simple classification, that some classes or sets of objects are also sub-sets of a larger class. Conservation. The realization that objects or sets of objects stay the same even when they are changed about or made to look different. Decentrationis ability to move away from one system of classification to another one as appropriate Egocentrism, that you are the centre of the universe and everything revolves around you the corresponding inability to see the world as someone else does and adapt to it. Not moral "selfishness", just an early stage of psychological development. While Operationis the process of working something out in your head the representation in the mind of a set of perceptions, ideas, and/or actions, which go together.Assimilation, Qasim 1999, 163) representation is "the process of changing experiences to new experiences or is familiar with external stimuli adaptation or structures internal mental capita structures", representation according to (Arayfj and *et al*., 2005,14) : "the process that makes environmental data in the image can be with these data is received within the limits permitted by the individual cognitive repertoire, in the sense that the assimilation process related to modify the stimuli to become easier addressed".

In the view of(Mary Slim 2003, 365) that the representation is the process of taking the individual external events and experience, and united with the systems already in place, or is the process by which unite elements of the environment in the construction of knowledge of the child, and that means the integration of themes or new experiences in existing mental schemes, and metabolism active process characterized by logical analysis and perception as an attempt to integrate the expertise in cognitive activities exist. Harmonization, Accommodation according to Mary Slim (2003, 366) as: "Modify mental structures so that the information is not consistent with existing mental structures that are integrated with and then to be understood", and Smadi *et al*. (2001, 56) define it as the process of harmonization occurs when forced the individual to change the earlier charts that has a response to the position of the new, and when new information is consistent with the plans prior to the individual, he must develop a more harmonized by adjusting his thinking to fit with exciting rather than modifying the same exciting. Organizationis are kinds of knowledge has been difficult to impossible for students to build or acquire their own through strategies and constructivism learning models, especially those that relate to the facts and declarative knowledge in general.

characterized most of the learning tasks complexity of knowledge, they often include positions learning, constructivism tasks and problems require learners to make efforts to solve them, as it may require resolved that owns learner background knowledge is good and relevant to the problem, The lack of vision or a clear vision for the evaluation process according to the constructivism theory, structural education problem of social acceptance, various segments of the community parents, teachers, politicians, and social workers is still weak, all they want is primarily education provides students the basics of knowledge and contributes to the transfer from one generation to another, they also want the criteria and procedures are clear and specific, by which to judge the level of efficiency of the learners and they reach certain levels. teachers Resistance to strategies and constructivism learning models, either because they are not qualified to do their assigned roles in the light of these strategies and models, or they impose on them the functions and responsibilities and new roles make them abandon their traditional roles .Teaching models based on the constructivism theory There are several models of teaching based on the constructivism point view the most important strategies and teaching models based on the constructivism theory as follows: Problem centered learning Model Cycle Learning, Conceptual Change Model, Vee Shape Model, Constructivist Learning Model.

The concept of constructivism learning model

(El-Bana 2001) define learning model constructivism as: "help students to build their understanding and knowledge of scientific according to four sequential phases of the learning cycle stages. these stages are: advocacy, discovery, the stage of proposing solutions, interpretations, and finally the stage to take procedure, with an emphasis on linking science technology and society through the four stages", Maximus (2003, 55) define the learning constructivism model as: " it is a form helping students to build their understanding and scientific knowledge according to four stages excerpted in stages of the learning cycle. Emphasizes form on linking science technology and society, has built stages of the four ways you learn ,work under specialists in science or technology, what is in the mind of the learner when building concepts of scientific made in accordance with the philosophy of constructivism, the four phases of the model are:

advocacy and exploration ,proposing solutions, interpretations and implementation or stage of action", According Yager (Yager, 1991, 52-57) the constructivism model of learning aims to teach learners a new knowledge by building on their own, and supports self-learning through the development of processes of learning and research, with teaching this model through: (activation), exploration, discovery, innovation, proposal, interpretations and solutions, finally the action, learning model is a teaching models based on the constructivism theory, making the learner at the center of the educational process, and stresses on the interaction between the teacher and the learner, the cooperation of the educated among them inside the classroom, moving the process of teaching and learning according to this model in four Successive phases: advocacy, exploration, discovery, innovation, proposing explanations and solutions, and action (the application). Perkins, (Perkins 1991:18-27) and Maximus (2003, 57) a number of practicalities that underpin the model

constructivism learning, including: planning by the teacher to invite learners to participate effectively in the implementation of solving activity a specific problem or discuss a particular phenomenon, this stage comes at the beginning of learning new steps– Rely on concepts and perceptions and ideas of learners to discuss what raises them questions and find solutions to face them with a problem, while enabling them in the course of learning to discuss and test their ideas and suggestions, even if it is just because of the error is normal in the learning process, The teacher constructivism accept learners errors then perform discussion to be able to discover and correct their mistakes on their own, bring the right concepts and ideas somewhere they might have wrong concepts and ideas. Planning by the teacher to invite learners to participate effectively in the implementation of solving activity a specific problem or discuss a particular phenomenon, this stage comes at the beginning of learning new steps. Rely on concepts and perceptions and ideas of learners to discuss what raises them questions and find solutions to face them with a problem, while enabling them in the course of learning to discuss and test their ideas and suggestions, even if it is just because of the error is normal in the learning process, The teacher constructivism accept learners errors then perform discussion to be able to discover and correct their mistakes on their own, bring the right concepts and ideas somewhere they might have wrong concepts and ideas.

A comparison between the traditional method and the structural approach

TRADITIONAL	CONSTUCTIVISIM
Students learn individually and competitively	Students learn in a collective manner cooperative
Rated separately from teaching (education), and it is through the official final exams	Enter the evaluation process within the fabric of teaching and learning process, and carried out through the Teacher's Notes for pupils during their tasks and educational activities and through other non-traditional alternatives. provide an opportunity for students to addresses
The teacher seeks to get the correct answers as evidence of what he achieved or accomplished students.	Teacher seeks to know the viewpoint of the student in order to understand what the student to understand, and uses this understanding to guide and alter the course of the educational process
Students that they are passive recipients of knowledge, who provide them with what they see, without taking into account the needs and interests of students.	Teacher is seen as an active thinker and as a stand-alone world has its own vision and built your world around him.
Activities rely on textbooks only.	Activities depend on the sources of the reality of the environment and the tools and means of creative learning
Committed teacher is fully committed to the decision.	The teacher gives considerable attention to the questions of students.
Offers scheduled as parts scattered with an emphasis on basic skills.	College offers scheduled as a unit and focuses on the concepts of the major problems revolve around the students and their interests

Study population

Study population included all first year students in vocational education students in Balqaa Applied students.

The study sample

The study sample consisted of 90 students from two sections of students in vocational education of Balqa Applied University /Al-Huson university College were divided into two equal groups, one experimental using the constructivist learning model, and controlled group studied the same Subject in the traditional method, as in Table (1)

Table 1

Group	Section	Number of students	Group
Experimental	1	45	Experimental
Controlling	2	45	Controlling
Total		90	
		Number of students	

Study tools

The study included the tools: Teaching material: Textbook (College Algebra) for vocational education reformulated as learning model and includes Teacher's Guide to teaching the subjects according to Constructivism learning model stages .Student worksheets. The process of preparation of the teacher's Guide and student worksheets was as the Determine the General aims of teaching Geometry unit and analysis of the content of the geometry unit to mathematical concepts, generalizations, and mathematical skills. Review some of the previous studies and research that have implemented learning model built on mathematics teaching for preparation of a teacher's Guide. Review some of the studies and research that has one other teaching models based on the theory of constructivism in teaching mathematics. Review some research and previous studies that have implemented a Constructivism learning model in teaching subject other than mathematics. Teacher's Guide for teaching Geometry Unit Introduction to the teacher with a brief presentation of the theory of constructivism and stages of learning model

Study Procedures

An achievement test in plane geometry. A measure of mathematical thinking. (Scale mathematical thinking, which is prepared by Abu Zeina and Shatnawi (1982), the researcher process of harmonization of the scale. An achievement test being prepared in plane geometry by following these steps: Determine the goal of the test, content analysis of plane geometry (concepts, generalizations, and skills), identifying and formulating educational goals for topics plane geometry and classified according to the model of Wilson (J.Wilson).
- Prepare a table of test specifications.

Statistical methods

Using a number of ways statistical methods to analyze the data that has been collected, Holsti equation to measure the reliability coefficient, an achievement test in plane geometry, a measure of mathematical thinking scale mathematical Thinking, which is prepared by Abu Zeina and Shatnawi (1982), the researcher process of harmonization of the scale. An achievement being prepared test in plane geometry by following these steps: Determine the goal of the test. Do content analysis of plane geometry (concepts, generalizations, skills). Identifying and formulating educational goals for

topics plane geometry and classified according to the model of Wilson (J.Wilson) Prepare a table of test specifications. Using a number the following statistical methods to analyze the data that has been collected, Holsti equation to measure the reliability coefficient analysis. Pearson correlation coefficient. Guttman equation to calculate the reliability coefficient of the achievement test. Equation for calculating Cronbach alpha reliability coefficient scale mathematical thinking. Transactions and the difficulty of the discrimination test questions to measure achievement and mathematical thinking. Analysis of variance associated (ANCOVA), to test the significance of differences between the scores of experimental and control groups in the post application for each of the achievement test and measure the mathematical thinking, Test the hypotheses testing of the study and interpretation, has been associated with the use of analysis of variance to test the hypotheses of the study, and after verifying the conditions used, namely, the homogeneity of variance - Distribution equinoctial - homogeneity of regression. Presented test results for each of the imposition of the study the study hypotheses, in the form of a table, the results and interpretation of those results discussed, and the extent of agreement and disagreement with the results of previous studies.

Summary of the findings and recommendations and proposal

Findings

- There are significant differences at the level (≤ 0.05) between the average grades of the experimental group who studied using the constructivist learning model, and the control group students who have studied in the traditional method in the achievement test posttest, in posttest achievement test as a whole for remembering, understanding level for the benefit of students of the experimental group.
- There were statistically significant differences at the level (≤ 0.05) between the average grades of the experimental group who studied using the constructivist learning model, and the control group students who have studied in the traditional method to measure mathematical thinking in the appearance (deduction, induction mathematical expression (symbolism) logical thinking. and mathematical proof)to benefit of students of the experimental group.
- There is a positive correlation statistically significant at the level (≤ 0.05) between the scores - the study sample – in the post application of each of the achievement tests and measure the mathematical thinking.

Recommendations

In light of the findings of the study, can make the following recommendations:

- The use of constructivist learning model in the teaching of mathematics in college level, because of its positive impact on academic achievement and mathematical thinking in students.
- Training of Mathematics professors during the service, through seminars, courses, workshops, educational and other methods of training on the use of constructivist learning model in the teaching of mathematics.

- student introduce and training teachers who specialize in mathematics in colleges of education and teachers' colleges,and math major who are planning to go for teaching, to use and apply the constructivist theory as strategies and models of teaching in particular.
- Design and organization of mathematics textbooks in all levels and college level in the light of modern theories of learning, including the constructivist theory.
- Included math teacher books in various stages of education lessons and higher education prepared in accordance with the constructivist learning model, and the lessons prepared in accordance with the strategies and other teaching models based on the constructivist theory.

Proposals

- conduct similar studies in other mathematics topics and fields to see the effect of the use of constructivist learning model in teaching those subjects and to genrlize it as method of trashing in college level.
- examining the impact of the use of constructivist learning model in the teaching of mathematics to other learning outcomes, and the development of other patterns of thinking like thinking critically and creative thinking and scientific thinkingin college level

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