

COMPARE THE EFFECT OF MASTERY LEARNING AND CONSTRUCTIVIST APPROACHES TO THE ACADEMIC ACHIEVEMENTS OF TEACHERS

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Abstract- The purpose of this experimental study was to examine the effectiveness of Mastery Learning and Constructivist Approaches to the Academic Achievements of Prospective Teachers who Attended Curriculum Development and Teaching Lesson at Pedagogical Formation Education. The study was applied in 2014-2015 academic year at spring term on the students of Ondokuz May University. Participants in this study attended 19 May University Education Faculty in Samsun There were 80 students 40 from History, 40 Literature department of Pedagogical Formation Education program. The data gathered with an academic achievement test comprised 69 items about Curriculum Development and Teaching lesson which developed by the researcher. Pre-test and post-test control group experimental design has been conducted. Findings and Results: According to findings, it was seen that there is meaningful difference between experimental' and control group. It has been found that the experimental (constructivist approach) increases academic achievement more than control group (mastery learning) t-test is used t: -7,597; $p < 0.005$. The findings gained in this research show that being a significant difference in experiment group favor on the points of final test and achievement points. The findings of the study show a significant difference in favor of the experimental group, versus the control group, in both the final test scores and achievement points. In experimental group, constructivist approach learning model was used.

Keywords- Constructivist learning approach, pedagogical formation program, prospective teacher, Mastery learning, Academic Achievements

Curriculum Development and Teaching consists basic concepts, theoretical foundations of curriculum development. Curriculum designs and models curriculum development process. Teaching principles, the importance and benefits of planned study, education teaching methods and techniques, the association of those with application, new trends in education. Curriculum designs lend form to, and chart provisions for, the processes of learning and teaching and become concrete and operational at various stages of educational practice. The mastery learning model, it is aimed at providing appropriate learning environments by considering the individual differences of the students so that they do not hinder the target learning activity. Mastery learning theory is based on the idea that cognitive introduction behaviors. Constructivism transforms the student from a passive recipient of information to an active participant in the learning process. Constructivism in education emerged after the behaviorist movement as a welcome and refreshing view of learning that centers on the active learner within the teaching-learning process. Mastery learning resulted in a radical shift in responsibility for teachers; the blame for a student's failure rests with the instruction not a lack of ability on the part of the student. In this type of learning environment, the challenge becomes providing enough time and employing instructional strategies so that all students can achieve the same level of learning Bloom believes that there are three dependent variables in classroom learning and if they are considered carefully, the schools will be able to take step toward an educational system free from

mistake. On the basis of this theory, change in cognitive entry behaviors and affective entry characteristics and learning quality determine learning outcome. The mastery learning model, it is aimed at providing appropriate learning environments by considering the individual differences of the students so that they do not hinder the target learning activity.

Mastery Learning Process

In Carroll model, classroom learning is a time-based phenomenon that is the longer the time of learning, the higher the rate of learning will be. Bloom confirming this material believed that if the students were provided with learning opportunity and quality of instruction is commensurate with their personal need, about 95% of them reach mastery learning level. Bloom converted theoretical model of Carroll to a practical model for classroom learning, so that one can provide opportunity in the classroom that all students can achieve high level of academic achievement and their differences in learning can be minimized. Constructivism is a paradigm that hypothesizes learning as an active, contextualized, or constructive process. In contrast, constructivist or student-centered learning poses a question to the students, who then work together in small groups to discover one or more solutions Students play an active role in carrying out experiments and reaching their own conclusions. Teachers assist the students in developing new insights and connecting them with previous knowledge. In fact, repeated research has found that teacher centered. Constructivism allows us as, as educators, the conceptual tools with which to

view our students and how they learn in a way that is congruent with best practice. Constructivist best practice” in the past has been defined by practitioners and those observing them: by teacher anecdotal evidence, clinical observation, the success of affective and social teaching, and, increasingly, the positive relationship of constructivist teaching and academic success. Constructivism refers to the process by which human beings actively make sense out of the world around them to understand. Constructivism requires that we reflect on all aspects of the teaching in which we engage; as educators, we are learners ourselves.

The concept of mastery learning could be dated back to 1963, when John B Carroll first described the radical proposition that aptitude, instead of being a proxy of intelligence, is a measure of the amount of time needed for a person to learn, suggesting that all students are able to achieve the same degree of learning if sufficient time and learning opportunities are provided (Carroll, 1963, 1989). Research indicates that the way teachers teach and that it is especially useful in supporting more student-centered approaches to instruction and in developing the higher order skills and promoting collaborative activities (Haddad, 2003).

Major claims of mastery learning are the high level of educational outcome. Numerous studies have indeed supported the positive effects of mastery learning on academic achievements (Block & Airasian, 1971; Block & Burns, 1976; Burns, 1979; Hyman & Cohen, 1979). These inconsistencies can be attributed to a multitude of factors, such as different focus, inclusion or criteria and analytical procedures used in each review. The existence of multiple confounding factors in a typical classroom setting can also augment or diminish the overall effectiveness of ML (Anderson & Burns, 1987; Kulik et al., 1990). Specifically, Bloom and his students demonstrated that mastery learning was able to raise the students' mean scores to at least one Standard deviation greater than that of conventional group-based instruction (Bloom, 1984). Various meta-analyses conducted over the years, though they reaffirm the positive impacts of mastery learning, were unable to reproduce the high effect size (ES) of one standard deviation achieved by Bloom. In addition, large variations in the mean ES of mastery learning computed by different reviewers were also apparent (Guskey & Gates, 1986; Kulik et al., 1990; Slavin, 1987). In fact, it might even be inappropriate to measure a central tendency due to the extremely variable nature of mastery learning (Guskey & Pigott, 1988). Mastery learning (Block & Anderson, 1975) is an approach to learning intended to bring all students to a pre-established level of mastery on a set of instructional objectives. Students are taught to well-defined objectives, formatively assessed, given corrective instruction if needed, and then summative assessed. Mastery learning uses differentiated and

individualized instruction, progress monitoring, formative assessment, feedback, corrective procedures, and instructional alignment to minimize achievement gaps (Bloom, 1971; Zimmerman & Dibenedetto, 2008). Traditional approach followers assume that there is a fixed body of knowledge that the student must come to know. Students are expected to blindly accept the information they are given without questioning the instructor (Stofflett, 1998). This teacher-centered method of teaching also assumes that all students have the same level of background knowledge in the subject matter and are able to absorb the material at the same pace (Lord, 1999). One of these individual learning methods is mastery learning method (Spencer, 1996). As Gentile (2003) said, mastery learning method includes two systems each being derived from different theories but they are common in learning goals and standards. The first system is "Keller Personalized System of Instruction" which is an individual method in which some large groups are taught. Basis of this system is on a behavioral model of which development and progress depend on success of the students in doing their homework in the curriculum. The second system is "Mastery for Learning Group-Based Approach" which is applied as communal approach. This idea was presented in John Carroll learning model (1963-1965) and was expanded later by Benjamin Bloom (1968). It should be known that the planned education is the responsibility of schools (Bloom, 1979: 7). It is assumed that learners have to construct their own knowledge individually and collectively. Each learner has a tool kit of concepts and skills with which he or she must construct knowledge to solve problems presented by the environment. The role of the community other learners and teacher is to provide the setting, pose the challenges, and offer the support that will encourage mathematical construction." (Davis, Maher, Noddings, 1990, p. 3) Constructivism is not a theory about teaching, it is a theory about knowledge and learning the theory defines knowledge as temporary, developmental, socially and culturally mediated, and thus, nonobjective." (Brooks & Brooks, 1993, p. vii) Knowledge, no matter how it be defined, is in the heads of persons, and that the thinking subject has no alternative but to construct what he or she knows on the basis of his or her own experience." (von Glasersfeld, 1995 the doctrine itself holds that "language users must individually construct the meaning of words, phrases, sentences and texts." (Suchting, 1998, p. 61-62; von Glasersfeld, 1989, p. 132) Constructivists allege that it is we who constitute or construct, on the basis of our theorizing or experience, the allegedly unobservable items postulated in our theories." (Nola, 1998, p. 32) The central principles of this approach are that learners can only make sense of new situations in terms of their existing understanding. Learning involves an active process in which learners construct meaning by

linking new ideas with their existing knowledge." (Naylor & Keogh, 1999, p.93) Constructivists of different persuasion (hold a) commitment to the idea that the development of understanding requires active engagement on the part of the learner." (Jenkins, 2000, p.601) Lessons can be less or non-productive, and in some cases, detrimental to the students' learning process (Zoller, 2000). Even the in activities based subjects, although activities are done in a group but do not encourage discussion or exploration of the concepts involved. This tends to overlook the critical thinking and unifying concepts essential to true science literacy and appreciation (Yore, 2001). According to Audrey Gray, the characteristics of a constructivist classroom are as follows: the learners are actively involved the environment is democratic the activities are interactive and student-centered the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous. Each learner has a different interpretation and constructions of knowledge process based on mental representations (Learning Theories Knowledgebase, 2008). Constructivist learning theory is based on educational psychology. Jean Piaget (1896-1980) was the first theorist who regarded children as 'builders of their intellectual structures'. Another Soviet psychologist Lev Semanovich Vygotsky (1896-1934) studied how children learn through communication with others (such as parents and peers). These educational psychology theories have been further developed by a number of constructivists (Wilson, 1996; Duffy, Lowyck and Jonassen, 1993; Papert, 1980 The constructivism is a perspective that emerged in evolutionary and informatory psychology, whose prominent figures include Bruner (1990), Kelly (1955), Piaget (1969) Von Glaserfeld (1995) and Vygotsky (1978). Below are some general principles of learning derived from constructivism (Smith and Ragan, 2000; Driscoll, 2001; Duffy & Jonassen, 1992):

CONSTRUCTIVIST PRINCIPLES

Jonassen (1996) proposed that learning environments should provide active, intentional, complex, contextualized, reflective, conversational, collaborative, and constructive learning. To Piaget Inhelder (1969), the structuralism asserts that each individual creates a mental world in his individual informatory process. In modern psychology, the notion of cognitive construction was first forged into a major component of developmental theory by James Mark BALDWIN (1861–1934) and Jean PIAGET (1896–1980). Almost certainly unaware of Vico's treatise, they set out from a Kantian position and endeavored to map the procedures and operations by means of which the human subject, having access only to sensation and to the operations of the mind, constructs a relatively stable experiential world. Many teachers are hesitant to try the constructivist

model, because it requires additional planning and a relaxation of the traditional rules of the classroom (Scheurman, 1998). Constructivism-as adopted in Science Education (as opposed to wider interpretations of 'constructivism' in the social sciences, e.g., Beld, 1994; Potter, 1996; Gergen, 1999; Phillips, 2000b; Matthews, 2000)-is a perspective which views human learning as an active process, i.e., something done by, not on or to, the learner herself. Until recently, "best practice" has been defined by traditional behaviorist definitions focused on student academic outcomes; constructivist "best" practice is a relatively new focus of research. " (Zins, Weissberg, Wang, & Walberg, 2004).
Method

RESEARCH INSTRUMENTS

This is an experimental type of study to find out the effects of mastery learning and constructivist approaches to the academic achievements of prospective teachers who attended curriculum development and teaching lesson at pedagogical formation education. Two groups' students were selected. A group was constructivist approach while other group was mastery learning approach method. Pre and post Tests was administered to both experimental and control groups. Achievement test with 69 items was used as pre-test. Before students are administered the education program, both experimental and control group are taken from same level namely before the education their pre-test scores are compared. Their average scores were compared using independent t-test and results are given in Table 1. After the applications of pre-testing, it was started to teach lessons for 14 weeks. The learning activities related to learning approaches were applied in the learning process. In the study, students of the experimental and control group was applied the curriculum development instructor program that prepared by researcher. Educational program applications were performed as 28 lessons during 14 weeks. Activity in a day continued for 90 minutes. Before program and after program pre-test and posttest has been conducted. t-test analysis were used. While testing the difference between ideas significance level is taken in significant at α 0.05 level of significance. Participants in this study attended 19 May University Education Faculty in Samsun There were 80 students 40 from History, 40 Literature department of Pedagogical Formation Education program. The data gathered with an academic achievement test comprised 69 items about Curriculum Development and Teaching lesson which developed by the researcher. At first 78 item were prepared on a small group with 40 students of sample group, but 9 items were not included because of insufficient scores. Pre-test and post-test control group experimental design has been conducted. Pre and post Tests was administered to both experimental

and control groups. Test results were entered to SPSS 15 After pre-test, t-test was used to check difference between both groups. After post-test, t-test was used to find the effectiveness of both constructivist and mastery method of teaching. The problem of the study was if there is any significant difference between the means of achievement scores of constructivist approach learning and mastery learning. Sub- problems were; Is there any significant difference between the mean scores of constructivist learning approach and the mean scores of experimental learning on pre-test in the lesson of curriculum development and teaching? Is there any significant difference between the mean scores of constructivist learning approach and the mean scores of experimental learning on post-test in the lesson of curriculum development and teaching? Is there any significant difference the mean scores on pre-test and post-test of constructivist learning approach? Is there any significant difference the mean scores on pre-test and post-test of mastery learning approach? Test results with curriculum development and teaching consisted basic concepts, theoretical foundations of curriculum development (historical, philosophical, psychological, and social basics), curriculum designs and models curriculum development process (planning, design, testing and evaluation, bringing continuity to curriculum). Teaching principles, the importance and benefits of planned study, education planning (annual plan, daily plan and examples of activities), teaching methods and techniques, the association of those with application, new trends in education and teaching (active learning, multiple intelligences, constructivism, life-long learning, creative thinking, etc.), the duties and responsibilities of the teacher in enhancing the quality of teaching. At first 78 item were prepared on a small group with 40 students of sample group, but 9 items were not included because of insufficient scores. Pre-test and post-test control group experimental design has been conducted. Educational program applications were performed as 28 lessons during 14 weeks. Activity in a day continued for 90 minutes. Before program and after program pre-test and posttest has been conducted.

POPULATION AND SAMPLES

The study population consisted of a total of 300 students who attended curriculum development and teaching lesson at pedagogical formation education program. The study was applied in 2014-20145 academic year at spring term on the students of 19 May University The study sample consisted of 80 students who attended 40 at History, 40 at Literature department, 47 of female and 33 of male students.

Results

Table 1 Results of the Differences in Experimental and Control Group Pre-Test Both Experimental “Constructivist Approach” and Control Group

“Mastery Learning “Scores from Paired Samples T test

Groups	N	X	SD	t	P
(Control)					
Mastery Learning			40	27,500	8,87231
		1,704	0,96		
(Experimental)					
Constructivist Approach	40			24,300	8,34266

As it seen on the table 1., the total mean value pre-test grades are 24,300 for the experimental group; 27,500 is the control group. Mastery learning standard deviation is 8,87231, experimental approach standard deviation is 8,34266. In order to determine the significance of the difference between the mean values of the total pre- test grades for the experimental and control groups, the t test of the independent groups was applied by using SPSS statistical analysis program t-test is used to find out if there is a significant difference between experimental and control groups’ average pre-test scores. It can be said that both groups are equivalent to each other as for the mean values of the pre- test, statistically significant ($p > 0.05$). Between pre-test and post-test average of achievement test $t: 1,704; p > 0.96$.

Table 2. Results of the Differences in Experimental and Control Group Post-Test Both Experimental “Constructivist Approach” and Control Group” Mastery Learning “Scores from Paired Samples T test

Groups	N	X	SD	t	P
(Control)					
Mastery Learning			40	70,1000	8,35986
		7,597	,000		
(Experimental)					
Constructivist Approach	40			84,7500	7,35457

As it seen on the table 2. the total mean value post-test grades are 84,7500 for the experimental group; 70,1000 is the control group. Mastery learning standard deviation is 8,35986, experimental approach standard deviation is 7,35457. In order to determine the significance of the difference between the mean values of the total post- test grades for the experimental and control groups. After educational program applications were performed as 28 lessons during 14 weeks t test of the independent groups was applied by using SPSS statistical analysis program t-test is used to find out if there is a significant difference between experimental and control groups’ average post-test scores. There has been significant difference between experimental and control groups on post-test ($p < 0.005$). Experimental group has been more successful than control group. Between control and experimental group post-test average of achievement test $t: -7,597; (p < 0.000)$.

Table 3. Results of the Differences in “Mastery Learning” Group Pre-Test Posttest for Scores from Paired Samples T test

Groups	N	X	SD	t	P
Pre-test	40	27,500	11,40580		
Post-Test	40	70,100			

As it seen on the table 3, the total mean value for pre-test 27,500 and posttest 70,100 for the experimental group. Standard deviation is 11,40580. In order to determine the significance of the difference between the mean values of the total pre and post- test grades for the control “mastery” group. After educational program applications were performed as 28 lessons during 14 weeks t test of the independent groups was applied by using SPSS statistical analysis program t-test is used to find out if there is a significant difference between the average pre and post-test scores. There has been significant difference between pre-test and post-test ($p < 0.005$). Between pre-test and post-test of mastery learning group the average of achievement test t: -23,622 ; ($p < 0.000$).

Table 4. Results of the Differences in Experimental “Constructivist Approach“ group Pre-Test and Posttest for Scores from Paired Samples T test

Groups	N	X	SD	t	P
Pre-test	40	25.300	9,97420	-37,697	,000
Post-Test	40	84,750			

As it seen on the table 4, the total mean value for pre-test 25,300 and posttest 84,750 for the experimental group. Standard deviation is 9,97420. In order to determine the significance of the difference between the mean values of the total pre and post- test grades for the control “mastery” group. After educational program applications were performed as 28 lessons during 14 weeks t test of the independent groups was applied by using SPSS statistical analysis program t-test is used to find out if there is a significant difference between the average pre and post-test scores. There has been significant difference between pre-test and post-test ($p < 0.005$). Between pre-test and post-test of constructivist approach group the average of achievement test t: -37,697 ; ($p < 0.000$).

Conclusions and Recommendations

Findings and conclusions of the study suggest that there has been significant difference between constructivist approach and mastery learning on post-test ($p < 0.005$). Constructivist approach group has been more successful than mastery learning group. When the findings of the study is examined, statistical analysis results about whether there is a difference between the pre-test scores of control and experimental groups are seen that groups are similar. Both groups were exposed to similar educational experiences before they had begun education program and they are similar in their education level. To see the effects of the program when compared to the current program in their success both control and

experimental group’s difference in their average post-test scores are compared. The findings gained in this research show that being a significant difference in experiment group favor on the points of final test and achievement points. The findings of the study show a significant difference in favor of the experimental group, versus the control group, in both the final test scores and achievement points. In experimental group, constructivist approach learning model was used. There was a significant statistical difference between the results of the achievements of the experiment and control groups in favor of the experiment group. According to these results, it is clear that the constructivist approach learning model affected the success and achievement of the students positively in curriculum development and teaching lesson at pedagogical formation education. From the findings of the study, the following conclusions were drawn:

a)- The mean score of experimental group was almost equal to the mean score of control group on pre-test. Therefore, it is concluded that both the groups were equal before the start of experiment.

b)- The mean score of experimental group was significantly different from the mean score of control group. It found that the experimental group performed better than the control group on posttest. The teacher will try to maintain the view that students are to make sense in their experiential world. Hence he or she will be interested in students’ ‘attempting errors’ and, indeed, in every instance where students deviate from the teacher’s expected path because it is these deviations that throw light on how the students, at that point in their development, are organizing their experiential world. Constructivist learning and the theory that supports it can help teachers to defend those important aspects of classroom life not directly affected by the state tests. Because the theory of constructivism is being supported in many ways by research in laboratory and practical situations, it is incumbent on educators, researchers, and theorists to embrace its constructs and put them into practice throughout the field of education. Shifts emphasis from teaching to learning individualizes and contextualizes students ‘learning experiences helps students develop processes, skills and attitudes considers students ‘learning styles focuses on knowledge construction, not reproduction uses authentic tasks to engage learners provides for meaningful, problem-based thinking requires negotiation of meaning requires reflection of prior an new knowledge students beyond content presented to them. The results of experimental design will be very beneficial for teachers to help them select the most effective strategies based on sound evidence. The constructivist learning theory and teaching approaches have many advantages in comparison with traditional learning theories and approaches. Instructors should explain their expectations clearly. Instructors should also express that they are going to

evaluate the assignments in terms of appropriateness to the ethics and inform students about unethical behaviors. The constructivist teaching models, if used in the teaching of environmental science can give the students a broader perspective on the ways in which the different aspects of our human environment interact with each other, and provide the student with the relevant skills and abilities to become the effective environmental managers of the future which are so urgently needed.

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