The Effects of Mastery Learning Model on the Success of the Students Who Attended "Usage of Basic Information Technologies" Course

Ibrahim Y. Kazu
Faculty of Technical Education
Fırat University, Elazığ, 23119 TURKEY
Tel: +90 424 237-0000 ext 6241
Fax: +90 424 236-7064
iykazu@firat.edu.tr

Hilal Kazu
Faculty of Technical Education
Fırat University, Elazığ, 23119 TURKEY
Tel: +90 424 237-0000 ext 3484
Fax: +90 424 236-7064
hkazu@firat.edu.tr

Oguzhan Ozdemir
Department of Informatics
Fırat University, Elazığ, 23119 TURKEY
Tel: +90 424 237-0000 ext 5017
Fax: +90 424 237-0073
oguzhan@firat.edu.tr

ABSTRACT

In order to realize one of the most important necessities of the life, which is learning, the human being spends most of their life for education-training activities. In the conventional applications, every individual, being a part of a group is dependant on a single program and an educational management which was chosen for the group by the teacher. However, each student has individual learning abilities, different from other members of the group. At the end of the teaching activities with one group, nearly all of the individuals of that group are expected to be successful. This study was performed at the Technical Education Faculty of Fırat University in Elazığ during 2002-2003 autumn term in order to determine the effects of this mastery learning model on the success of the students who attended the "Usage of Basic Information Technologies" course. The findings gained in this research show that being a significant difference in experiment group favour 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, mastery learning model was used. Therefore, it was seen that mastery learning model increased the student achievement effectively.

Keywords

Mastery learning, Individual differences, Technology education, Information technologies

Introduction

The answers to the questions such as "How can I teach better? How can a person learn better? and "How is it possible to remember the learned material all the time?" have been surveyed for centuries through many studies. In the results of such studies, sometimes new learning models and new program types have been found. An education may also be possible as a result of the experiences gained through the family, environment, religion and mass communication media. But it should be known that the planned education is the responsibility of schools (Bloom, 1979: 7). Whatever comes out of the scientific studies, an important part of the education is at schools. It is a fact of current education systems all over the world.

This fact, which is an important part of the education, occuring at school also brings with it some problems that need to be solved. One of these problems is the number of the students participating in classes are more than the capacity of physical space. In this case we encounter another problem: "do all students have the same characteristics to take the same education through the same teacher, in the same conditions, and environment? Don't they have any differences between each other?" When the answers of these questions and the number of

the students at the school are considered, it can be concluded that individual differences should be taken into consideration. Disregarding these differences leads to the problems mentioned above.

The genetic characteristics and the environment make every person different even twins. We cannot expect a group of people having such differences to react in the same way in all the details and aspects. The same is valid for learning; we cannot expect the same level of learning from different students under the same conditions.

In the existing system, every individual in a group is unfortunately dependant on the program and teaching method chosen. However, each student has individual learning characteristics. A program disregarding these individual differences will result in a better learning performance by the students who are inclined towards the selected program and the teaching method used while the others may not learn as much. On the other hand, at the end of education activities, nearly all of the members of the group are expected to be successful. Of course the expected success level, i.e. 70 – 80 % success instead of 50% which is expected in conventional methods will be an indication of the success of the education activity.

We use a different approach to the instruction which does not place a premium on time in class. We base our unit of instruction on mastery of school subjects rather than on the time spent on them. In mastery learning, students must demonstrate the knowledge of the subject to be learned before credit is given. We believe that mastery learning provides the greatest opportunity for the students who are out of step with their coursework to catch up, or in many cases, to accelerate their high school program. Mastery learning requires a pre-determined level of knowledge which is understood and agreed by the cognitive introduction behaviors test, or the skill to be attained by gaining this mastery is the goal of student effort.

The subjects, requiring individual practice are the ones where the students have the possibility to be alone and to practice by themselves. The subjects related with computers and other technologies are the best examples of this fact. In these classes, generally every student has a computer or experiment set and in this case they will practice on their own. When the student is on their own, they will have the possibility to make use of their own individual characteristics. In the process of adaptation to the 21st Century, for which we have great expectations, the duty of the educators is to minimize the obstacles in front of teaching and learning, to enable maximum learning and to teach making use of computers which are the easiest way of achieving the knowledge.

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. Because, according to Bloom, the mastery learning theory is based on the idea that Cognitive Introduction Behaviors (i.e. pre-learning which is assumed to be necessary for learning a unit) which are the students' characteristics, Emotional Introduction Features (the level of motivation to learn the unit) and the quality of teaching activity are the basic indicators of learning output. The variables "clue, reinforcement, student's participation, feedback and correction", which Bloom described as the quality of teaching activity, explain the activities which are prepared by the teacher to enable mastery learning. According to this theory, if the related introduction features of the student along with the teaching activities are positive, the learning output will reach a high level and in respect to these outputs, the differentiation between the students will be at the minimum level (Sever, 1997). The variables of mastery learning are shown in figure-1.

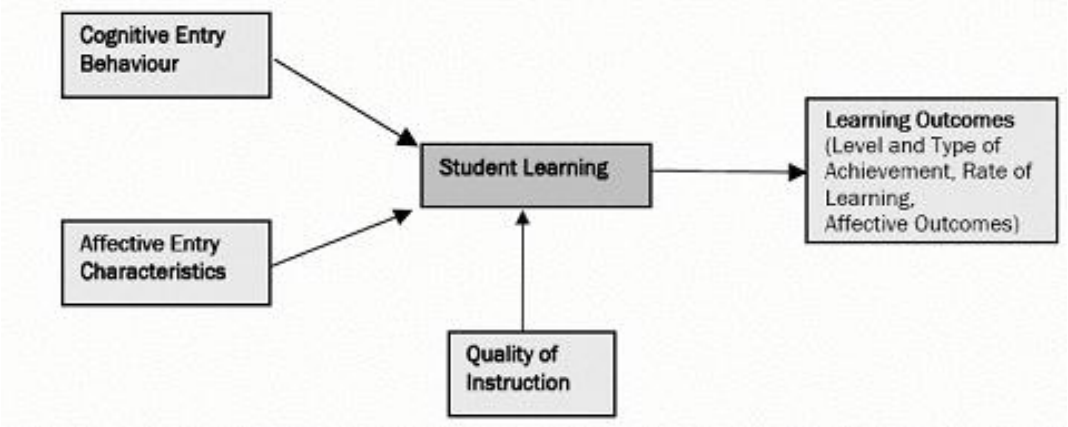

Figure 1. The Variables of Mastery Learning (Wong, 2002)

The theories of 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 (Levine, 1985; Bloom, 1981).

Mastery learning is an instructional strategy based on the principle that all students can learn a set of reasonable objectives with appropriate instruction and sufficient time to learn. Mastery Learning puts the techniques of tutoring and individualized instruction into a group learning situation and brings the learning strategies of successful students to nearly all the students of a given group. In its full form it includes a philosophy, curriculum structure, instructional model, the alignment of student assessment, and a teaching approach.

How to instruct for mastery

- Clearly state the objectives representing the purposes of the course.
- The curriculum is divided into relatively small learning units, each with their own objectives and assessment.
- Learning materials and instructional strategies are identified; teaching, modeling, practice, formative evaluation, re-teaching, reinforcement, and summative evaluation are included.
- Each unit is preceded by brief diagnostic tests, or formative assessments.
- The results of formative tests are used to provide supplementary instruction, or corrective activities to help the learner overcome problems.

As a matter of curriculum development, mastery learning does not focus on content, but on the process of mastering it. Curriculum materials can be designed by in-house instructional designers or via a team approach by various professionals in a given setting either in a school or industry. Instructional materials can also be obtained as prepared materials from an outside commercial source. A combination of these is also possible however, the instructional materials are developed or obtained; the teachers must evaluate the materials they plan to use in order to ensure that they match the instructional objectives set up for a given course of instruction.

The great advantage of a mastery approach for catch-up or accelerated work is that, as teachers, we start by finding out what our students know, and then help them learn the things they will need to know in order to demonstrate mastery. Using a mastery approach also provides flexibility for accommodating instruction to individual learning styles, needs and interest.

Advantages

- Students have prerequisite skills to move to the next unit
- Requires teachers to do task analysis, thereby becoming better prepared to teach each unit
- Requires teachers to state objectives before designating activities
- Can break cycle of failure (especially important for minority and disadvantaged students)

Disadvantages (easily dealt with in most cases)

- Not all students will progress at same pace; this requires students who have demonstrated mastery to wait for those who have not or to individualize instruction
- Must have a variety of materials for remediation:
- Must have several tests for each unit
- If only objective tests are used can lead to memorizing and learning specifics rather than higher levels of learning

In this study, the ways of acquiring computer literacy and making use of the information technologies at the highest level by the university students, which is a pre-requisite to adapt to the modern age and to allow such an acquisition to occur, are addressed. The use of the mastery learning model in “Usage of Basic Information Technologies” class by university students and the effects of the model on the success of the students have been investigated. It is accepted that the individual differences do not form a hindrance to the educators in achieving that goal in mastery learning model. It is suggested that the results of this investigation may from a base for studies to enable university students to make use of the basic information technologies at a maximum level.

The Aim and Subjects of the Study

The general aim of the study is to define the effect of the mastery learning model on the success level of the students who attend the "Usage of Basic Information Technologies" class. Results of hypothesis testing are as follows:

- There is a significant difference between the averages of pre-test and final tests of the control groups.
- There is a significant difference between the averages of pre-test and final tests of the experiment groups.
- There is a significant difference between the averages of final tests of the experiment and control groups.
- There is a significant difference between the averages of points of the experiment and control groups.

The criteria for the selection of experiment and control groups are sufficiently objective. The multi choice test used in the study is reliable.

The study conditions were as follows:

- The study took place during the autumn term of the 2002-2003 academic year.
- The subject "Usage of Basic Information Technologies" is limited to Microsoft Word and Microsoft Excel themes.
- The study is limited with the mastery learning model to be applied to the experiment group and the conventional method to be applied to the control group.

Methodology

In this part of the study, the investigation model, hypothesis and limitations, collecting and analyzing data will be described. In the study, the pre-test and final-test are used. An experiment group and a control group are formed. The effect of the independent variables, mastery learning model and conventional education program, on the success of the students has been investigated.

The study took place using the students in the first class of the Technical Education Faculty at Fırat University and the sample group was formed by the students who attended the Usage of Basic Information Technologies course in the autumn term.

The experimental and control groups were selected by using cluster analysis in order to maintain objectivity between the students of first class.

The cluster analysis criteria were:

- The scientific exam points which the students achieved on the University Entrance and OSS examinations.
- The success points from secondary education of the students.
- The result points that the students achieved in the pre-test.

Improvement of Data Collection Media: the theoretical dimensions were formed by the evaluation of the data obtained through scanning both literature sources and experts' views. The experimental data were collected with the help of scientific introduction behaviors test, success test, follow-up tests and parallel tests.

Since the result of the study would be obtained from comparisons of the pre-test and final-test, a success test was developed. During the development of the success test, a content analysis was performed using experience and knowledge gained from previous classes taught by the authors on the same subject, available books on the subject and experts in the field. The aims and objectives of the course were defined in accordance with this content analysis. The definition table was prepared to measure behaviors and a success test was developed again after taking the opinions and confirmations of the expert lecturers on information technologies, program development and mastery learning. The success test was applied to 217 students who attended the Usage of Basic Information Technology Class before and after the analysis. The result was determined by the reliability and validity analysis to have a KR= 0.792.

For the content validity of the success test, the support of the lecturers at Informatics, Computer Teaching and Computer Engineering Departments of Fırat University were sought and the lecturers responded positively.

Application of the Investigation and Collecting the Data

At the beginning of the application, the success test was given as the pretest to the control and experiment groups. At the same time, the cognitive introduction behaviors test was given to the experiment group in order to determine whether they had the necessary pre-knowledge. The students who do not have the cognitive introduction behaviors were given a complementary training before starting the first unit. In the experiment group, the units were taught based on the mastery learning model, and for the students' participation, the question and answer method was used. At the end of each unit, follow-up tests were given to determine whether the students had achieved the mastery learning goals or in case of failure to achieve the goal, what correction training needed to be performed. At the end of the study, both the experiment group and the control group were given the success test and the result of these tests formed the database for the final test.

For the related analysis of the individual characteristics and test results of the students, frequency, percentage and arithmetical average were used. Moreover, in the analysis of the obtained data and in the comparison of the points from the pre-test and final-test, dependent and independent groups t tests were used.

Findings and Comments

The investigated applications of the study, the statistical data derived from these investigations and the interpretation of these data have been discussed. As a result of the comparison of the pre-tests results applied to the experiment and control groups with statistical methods, Table 1 is obtained. The pre-test results were compared with the t test.

Table 1. The Pre-Test Result Points Applied to The Experiment and Control Groups and Their Comparisons

CONTROL GROUPS			**EXPERIMENT GROUPS**		
Points	Frequency	Percentage	Points	Frequency	Percentage
6	2	3,70	6	1	3,03
8	3	5,56	8	1	3,03
9	2	3,70	9	1	3,03
10	1	1,85	10	1	3,03
11	4	7,41	11	1	3,03
12	5	9,26	12	1	3,03
13	2	3,70	13	4	12,12
15	4	7,41	14	1	3,03
16	2	3,70	15	5	15,15
17	2	3,70	17	1	3,03
18	4	7,41	18	2	6,06
20	5	9,26	19	1	3,03
21	6	11,11	20	2	6,06
22	3	5,56	22	3	9,09
23	4	7,41	24	3	9,09
24	3	5,56	25	2	6,06
27	1	1,85	27	2	6,06
28	1	1,85	30	1	3,03
Total	**54**	**100,00**	**Total**	**33**	**100,00**
GROUPS	**Range**	***Mean***	**Standard Deviation**	**T**	
Control Groups	54	16,72	5,68	- 0,68*	
Experiment Groups	33	17,31	6,12		

*P>05

As can be seen in table 1, there have been no significant differences between the experiment group and the control group in the results of the pre-test. Although there were students who knew the subjects of the unit before, not attending the class caused pre-test results to be low. Since both groups had low points in the pre-tests, there had been no significant difference between their knowledge of the subject prior to starting the course.

The results of the groups in the pre-test and final test had been compared with the t test results of the dependent groups. For these comparisons, the dependent groups' t test was used. The difference between the final test and pre-test of the control group was significant (Table 2). This result has confirmed the first hypothesis of the study stating "There is a significant difference between the averages of pre-test and final test results of the control group".

Table-2. The Pre-Test and Final Test Results of The Control Group and Their Comparisons

PRE-TEST			**FINAL TEST**		
Points	Frequency	Percentage	Points	Frequency	Percentage
6	2	3,70	18	2	3,70
8	3	5,56	23	1	1,85
9	2	3,70	24	2	3,70
10	1	1,85	25	1	1,85
11	4	7,41	26	3	5,56
12	5	9,26	27	2	3,70
13	2	3,70	28	4	7,41
15	4	7,41	29	1	1,85
16	2	3,70	30	3	5,56
17	2	3,70	31	5	9,26
18	4	7,41	32	2	3,70
20	5	9,26	33	3	5,56
21	6	11,11	34	2	3,70
22	3	5,56	35	4	7,41
23	4	7,41	36	2	3,70
24	3	5,56	37	8	14,81
27	1	1,85	38	3	5,56
28	1	1,85	39	3	5,56
			40	1	1,85
			42	1	1,85
			47	1	1,85
Total	**54**	**100,00**	**Total**	**54**	**100,00**

TEST TYPE	**Range**	***Mean***	**Standard Deviation**	**t**
Pre-test	54	16,72	5,68	-15,87*
Final test	54	32,39	5,85	

*P<.05

The findings related with the second hypothesis of the study which states "There is a significant difference between the averages of pre-test and final test results of the experiment group" show that there is a significant difference between the averages of pre-test and final test results of the experiment group. This difference can be seen in Table 3.

Table 3. The Pre-Test and Final Test Results of The Experiment Group and Their Comparisons

PRE-TEST			**FINAL TEST**		
Points	Frequency	Percentage	Points	Frequency	Percentage
6	1	3,03	28	1	3,03
8	1	3,03	30	2	6,06
9	1	3,03	31	1	3,03
10	1	3,03	33	2	6,06
11	1	3,03	34	4	12,12
12	1	3,03	35	2	6,06
13	4	12,12	36	3	9,09
14	1	3,03	37	2	6,06
15	5	15,15	38	1	3,03
17	1	3,03	39	4	12,12
18	2	6,06	40	2	6,06

19	1	3,03	41	1	3,03
20	2	6,06	43	2	6,06
22	3	9,09	44	3	9,09
24	3	9,09	45	3	9,09
25	2	6,06			
27	2	6,06			
30	1	3,03			
Total	**33**	**100,00**	**Total**	**33**	**100,00**

TEST TYPE	**Range**	***Mean***	**Standard Deviation**	**t**
Pre-test	33	17,61	6,12	-17,84*
Final Test	33	37,61	4,82	

*P<05

The most important result is the base of the study and we can see it by the comparison of the final tests. Also these findings have additional effect in confirming the third hypothesis. The first hypothesis is related with the difference of the final test results of experiment and control groups and this difference is shown in Table 4. This comparison was performed with the independent groups' t test.

Table 4. The Final Test Results of The Experiment and Control Groups and Their Comparisons

CONTROL GROUPS			**EXPERIMENT GROUPS**		
Points	Frequency	Percentage	Points	Frequency	Percentage
18	2	3,70	28	1	3,03
23	1	1,85	30	2	6,06
24	2	3,70	31	1	3,03
25	1	1,85	33	2	6,06
26	3	5,56	34	4	12,12
27	2	3,70	35	2	6,06
28	4	7,41	36	3	9,09
29	1	1,85	37	2	6,06
30	3	5,56	38	1	3,03
31	5	9,26	39	4	12,12
32	2	3,70	40	2	6,06
33	3	5,56	41	1	3,03
34	2	3,70	43	2	6,06
35	4	7,41	44	3	9,09
36	2	3,70	45	3	9,09
37	8	14,81			
38	3	5,56			
39	3	5,56			
40	1	1,85			
42	1	1,85			
47	1	1,85			
Total	**54**	**100,00**	**Total**	**33**	**100,00**

GROUPS	**Range**	***Mean***	**Standard Deviation**	**t**
Control Groups	54	32,39	5,85	-4,31*
Experiment Groups	33	37,61	4,82	

*P<.05

There was a significant difference between the final test results in favor of the experiment group. This result clearly shows the positive effect of the independent variable, i.e. mastery learning model on the dependent variable which is the success of the student.

Another result, which is as important as the final test result, is the achievement rate. The results of the comparison of such points which gives the opportunity to compare the achievement of the students can be seen in Table 5.

As it can be seen from the Table, a significant difference between the achievement results was found in favor of experiment group which confirms the fourth hypothesis of the study which states "There is a significant difference between the achievement test results of the experiment group and control group" it has been seen that the experiment group to which the mastery learning model was applied, had a better achievement rate than the control group to which the conventional method was applied.

Table 5. The Achievements of The Experiment and Control Groups and Their Comparisons

CONTROL GROUPS			**EXPERIMENT GROUPS**		
Points	Frequency	Percentage	Points	Frequency	Percentage
1	1	1,85	9	1	3,03
3	2	3,70	10	1	3,03
4	2	3,70	11	1	3,03
6	1	1,85	12	1	3,03
7	1	1,85	13	1	3,03
8	2	3,70	14	3	9,09
9	1	1,85	15	1	3,03
10	1	1,85	16	3	9,09
11	2	3,70	17	2	6,06
12	2	3,70	19	2	6,06
13	6	11,11	20	2	6,06
14	4	7,41	21	1	3,03
15	7	12,96	22	2	6,06
16	1	1,85	23	2	6,06
17	1	1,85	24	2	6,06
18	2	3,70	26	1	3,03
19	2	3,70	27	4	12,12
20	1	1,85	29	1	3,03
21	5	9,26	32	1	3,03
22	1	1,85	34	1	3,03
23	1	1,85			
24	1	1,85			
25	1	1,85			
26	2	3,70			
28	1	1,85			
29	1	1,85			
31	1	1,85			
32	1	1,85			
Total	**54**	**100,00**	**Total**	**33**	**100,00**

GROUPS	**Range**	***Mean***	**Standard Deviation**	**t**
Control Groups	54	15,67	7,25	-2,82*
Experiment Groups	33	20.00	6,44	

*P<.05

Conclusion

In the writings of Bloom, mastery learning was transformed from a virtually adventitious feature of programmed instruction to a major desirable characteristic of instruction in general. There came to be strong reasons why instruction should abandon a standard like "70% is passing." Such a statement means that some things have been learned and some have not, whereas the aim should be that all of the objectives of instruction are mastered (Gagne: 108).

In the follow up test after the first unit, the group was successful but could not reach the mastery learning criterion. The mastery learning criterion was achieved after correction training. In the second unit, the learning criterion was achieved without any correction training. This fact may be interpreted as a sign that the students had adapted to the mastery learning after a while.

There was no significant difference between the results of the success test applied to the experiment and control groups as a pre-test. There were students in both groups who had some experiences in the subjects of the Usage of Basic Information Technology Class. However, since they were only a few students and the group did not attend the class. It caused no significant difference in the results of the pre-test.

In the control group, the classes were performed with the conventional methods, and this caused a significant difference between the pre test and final test results in favor of the final test. Despite of the conventional method, attending this class helped the students to achieve some of the aimed knowledge and skills.

In the experiment group, the classes were performed according to the mastery learning model, and this caused a significant difference between the pre-test and final test results in favor of the final test. Moreover the difference was significantly higher than the one with the control group.

There was a significant statistical difference between the results of the success test applied to the experiment and control groups as a final test in favor of the experiment group.

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 mastery learning model affected the success and achievement of the students positively in Usage of Basic Information Technology Class.

In addition to these findings, some other results have been achieved through this study. The first and may be the most important of these results is the motivation of the students in learning, which is considered to be a result of the education system starting with the primary education until the university education. Although the class has a content which the student will make use of not only at school but all his/her life long, the students were motivated only to pass the class. The mastery learning model, as it can be deducted from the title, is a learning model which aims to enable the highest level of learning, and is opposite of the conventional method mentioned above. The second problem is, most probably dependent on the first one, the participation of the student involuntarily. There were students who never participated in the class unless the lecturer asked them to participate. However, in the course of time, these students started participating in the class as they saw their classmates participate more actively.

Suggestions

In the investigation, the lack of the cognitive introduction behavior has been specified. Because this deficiency would appear during the class, the cognitive introduction behaviors should be determined and these behaviors should be measured. In case of a deficiency detected, this should be corrected before the beginning of every unit and class. This process becomes more important in the graded units. Therefore at the beginning of each unit, the objectives, behaviors and cognitive introduction behaviors necessary for the unit should be explained.

It has been observed that the students do not participate when they are not obliged. The lecturer should use appropriate methods for the students' active participation. Moreover, the students should be taught the methods of achieving and using the knowledge; the situation should be avoided where students work only with the instant information. Successful students should be provided with reinforcements to enable them to be aware of their success.

During the term, instead of using total evaluation, formational evaluation should also be used. An evaluation after more than one unit, will be less valid and there will be no possibility for correction of the deficiency. Therefore, follow up tests should be applied at the end of each unit, and the determined deficiencies should be corrected.

The aims of the education should be accepted by the individuals, and the people should not attend the school only for the purpose of achieving a diploma. As a result the individual will accept the knowledge and skills related with the chosen profession voluntarily and be more motivated to strive for it.

The corrective education mentioned in this study was performed out of the class. This means extra time and a place to do the work. To enable the lecturers to provide such additional activities, the necessary environment must be provided, and the problems regarding the place for the work should be solved, and when necessary, financial support should be provided.

In the graded subjects which must to be learned at school, the level of learning depends on the attendance time. Therefore, necessary measures should be taken to avoid absenteeism in such classes. The attendance of the classes should be maintained used at the maximum levels.

Activities to develop emotional introduction features related with the subject should be performed in the first unit of the class. General and positive information about the subjects should be provided to the students.

While applying the mastery learning model, various teaching methods should be used for the application of the variables. For example, in order to enable participation, the question and answer method, clues and the example event methods may be used.

For those students who learn quickly in the classroom, different learning opportunities should be presented. This will help prevent the boredom of the students in the classroom.

References

Arslan, M. (1996). *Altı çizili materyalle çalışma ve tam öğrenme yönteminin öğrenme düzeyine, hatırlamaya ve akademik benlik kavramına etkisi* (Unpublished PhD thesis), Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Aydın, E. (1995). *Tam öğrenme metodu ve öğrenme ortamı organizasyonun İstanbul'daki bir özel okulun orta ikinci sınıfındaki öğrencilerin matematik başarı ve tutumlarına etkisi* (Unpublished Masters thesis), İstanbul: Boğaziçi Üniversitesi Sosyal Bilimler Enstitüsü.

Bacanlı, H. (2000). *Gelişim ve öğrenme*, Ankara: Nobel Yayıncılık.

Block, J. H. (1970). *Mastery learning theory and practice*, New York: Holt, Rinehart and Watson Inc.

Bloom, B. S. (1979). *İnsan nitelikleri ve okulda öğrenme* (Translator: Durmuş Ali Özçelik), Ankara: Milli Eğitim Basımevi.

Çetin, F. E. (1988). *Effects of university preparatory courses and mastery learning on final achievement test scores and university entrance exam scores of seniors in a Turkish high school* (Unpublished Masters thesis), İstanbul: Boğaziçi Üniversitesi Sosyal Bilimler Enstitüsü.

Demirel, Ö. (1999). *Planlamadan değerlendirmeye öğretme sanatı*, Ankara: Pegema Yayıncılık.

Ercan, F. (1989). *Başarı düzeyini artıracak bir öğretim yöntemi: Tam öğrenme* (Unpublished PhD thesis), Elazığ: Fırat Üniversitesi Sosyal Bilimler Enstitüsü.

Erdem, M. (1988). *Tam öğrenme kuramı ilkelerinin ilkokul öğretmenlerince uygulanışı* (Unpublished Masters thesis), Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Gagne, R. M. (1988). *Mastery learning and instructional design*, Retrieved October 15, 2005 from, http://www.ibstpi.org/Legacy-Gagne/chapter%204.pdf.

Kırkıç, K. A. (1994). *Effect of mastery learning method of instruction and laboratory experiments on achievement levels and science misconception scores of secondary school Turkish students* (Unpublished Masters thesis), İstanbul: Boğaziçi Üniversitesi Sosyal Bilimler Enstitüsü.

Külahçı, Ş. G. (1995). *Meslek analizi ve program geliştirme* (Öğretmen yetiştirme modül serisi), Ankara: Özışık Ofset.

Orlich, D. C., Harder, R. J., Callahan, R. C., Kravas C. H., Kauchak D. P., Pendergrass R. A., & Keogh A. J. (1985). *Teaching strategies*, Toronto: D.C. Heath and Company.

Özder, H. (1996). *Tam öğrenmeye dayalı işbirlikli öğrenme modelinin etkililiği* (Unpublished PhD thesis), Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Öztürk, M. (1990). *İlkokullarda fen bilgisi dersinde uygulanan, kendi kendine öğrenme yönteminin öğrenme ürünlerine etkisi* (Unpublished PhD thesis), Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Senemoğlu, N. (1987a). *Bilişsel giriş davranışları ve düzeltmenin erişiye etkisi* (Unpublished PhD thesis), Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Senemoğlu, N. (1987b). Tam öğrenme modeli, yararları ve sınırlılıkları. *Eğitim ve Bilim Dergisi, 2* (66), 28-33.

Sever, S. (1997). *Türkçe öğretimi ve tam öğrenme*, Ankara: Anı Yayıncılık.

Sönmez, İ. (1998). *Birleştirilmiş ve normal sınıflı köy ilkokullarında tam öğrenme uygulamasının öğrenme ürünlerine etkisi* (Unpublished Masters thesis), Ankara: Ankara Üniversitesi Sosyal Bilimler Enstitüsü.

Tuğal, İ. (1995). *Effects of grouping and mastery learning method of instruction on English achievement levels of lycee one students in Kuleli Military High School* (Unpublished Masters thesis), İstanbul: Boğaziçi Üniversitesi Sosyal Bilimler Enstitüsü.

Uzun, N. (1986). *Biçimlendirici değerlendirmenin yabancı dil erişisine etkisi* (Unpublished Masters thesis), Ankara: Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü.

Wong, K. (2002). A basic introduction to mastery learning. *The Newsletter Learning And Teaching Support, 2* (3).