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ABSTRACT

This study investigated the effects of mastery learning on learner achievement in the psychomotor domain and also sought to identify the specific learner who might benefit from the use of mastery learning techniques. Subjects were college students learning to play racquetball. Fourty-three students were assigned to three intact mastery classes, and forty-four to three intact non-mastery classes for a period of twelve weeks. A repeated measures analysis of covariance revealed the following major findings: (1) the achievement of the mastery group was significantly higher than the non-mastery group at the mid-test; however, in the post-test, the groups were statistically equal; (2) in particular, low aptitude students, females, and especially the low aptitude females benefitted from the conditions provided by mastery learning methods; and (3) the conditions provided by mastery techniques produced some less than positive attitudes about grading and the class in general. (Author/JD)

THE EFFECTS OF MASTERY LEARNING ON THE ACQUISITION OF PSYCHOMOTOR SKILLS. Connie L. Blakemore, Michael Goldberger, Temple University.

The purpose of this study was to investigate the effects of Mastery Learning, as proposed by Bloom, on learner achievement in the psychomotor domain as well as the specific learner that might be benefitted by the use of Mastery Learning techniques. The provision of definite standards of achievement, enough time to learn, and appropriate corrective help for unsuccessful students were the identifying factors of the model. Students at Temple University in Philadelphia, Pennsylvania were taught racquetball skills in physical education classes by instructors who either systematically applied or systematically did not apply Mastery Learning methods. Achievement was evaluated by performance on four racquetball tests before, during, and following each treatment. Aptitude was measured by a four item motor ability test which was administered at the beginning of the study. Forty-three students in three intact Mastery classes and forty-four students in three intact non-mastery classes were randomly assigned to treatment groups for 12 weeks. A repeated measures analysis of covariance revealed the following major findings: (1) the achievement of the Mastery group was significantly higher than the non-mastery group at the midtest. By the time of the posttest, however, the non-mastery group had improved to the point where both groups were statistically equal. (2) In particular, low aptitude students, females, and especially the low aptitude female benefitted from the conditions provided by Mastery Learning methods. (3) The Mastery techniques may produce some less than positive attitudes about grading and the class in general. The results of this study indicated that it would be wise to implement Mastery Learning techniques in classes where fundamental psychomotor skills are being taught. Classes where low aptitude students are enrolled indicate Mastery Learning techniques when enough time is allotted for those students to learn the skills.

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The Effects of Mastery Learning on the Acquisition of Psychomotor Skills

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Mastery Learning as outlined by Benjamin Bloom (1976) is a theory of school learning based on the premise that most students can learn at a high level what the schools have to teach if the learning is approached sensitively and systematically. Bloom argues that learners are "fast and slow" rather than "good and poor"; they need adequate time to learn, as well as enough individualized help to achieve success.

Although Mastery Learning has been comprehensively researched in the cognitive and affective domains, very little investigation has been done in the psychomotor domain and especially as it applies to physical education. The results of the available research in all domains indicates overwhelmingly that students who are taught using the Mastery Learning model achieve significantly higher than students who are taught using non-Mastery techniques.

Mastery Learning is defined in this discussion as a group-based, teacher-paced model of learning in which most students can achieve at a high level. The six major components of the strategy are:

1. Formal unit objectives which include performance standards.
2. Division of the course into smaller instructional units.
3. Diagnostic evaluation.
4. Accurate and frequent feedback on the learning process.
5. Corrective or alternative learning experiences for those students who need them.
6. Criterion-referenced summative evaluation.

Mastery is defined as the acceptable and required standard of achievement which must be met to pass a unit or task, set at a level falling between 85%-90% in normal distribution of scores.

Current Study

In the research conducted at Temple University in Philadelphia, Pennsylvania, a study was done to investigate the effects of Mastery Learning on achievement in the psychomotor domain. With college students the following questions were addressed:

1. Do the conditions associated with Mastery Learning positively affect motor skill acquisition?
2. Will students of low or high aptitude in motor skill learning benefit particularly from the conditions associated with Mastery Learning?
3. Will males or females benefit particularly from the conditions associated with Mastery Learning?
4. How will Mastery Learning conditions affect student's attitudes toward learning?

The study was conducted using a modification of the pretest-posttest non-equivalent control group design in intact racquetball classes. As such, two groups were compared before, during, and after their exposure to a treatment.

Three instructors, who were experienced in various teaching methods and who also demonstrated racquetball skills, volunteered to instruct the students. Each instructor taught two racquetball classes in which a treatment was randomly assigned to each. Of these, one class employed Mastery Learning techniques while the other class was conducted using non-mastery methods.

Instructors were taught, prior to the study, how to implement the two treatments. Weekly meetings were held to carefully monitor this process as the study progressed. Eighty-seven students participated in the study of which approximately

15 were enrolled in each class. The Mastery group had an N = 43, the non mastery group had an N = 44.

Students were tested on four racquetball tests to determine psychomotor achievement. Those tests were:

1. 30 sec. wall volley
2. Forehand placement
3. Backhand placement
4. Serve

Aptitude was measured by a four-item motor ability test administered at the beginning of the study. The tests consisted of 1) a basketball wall throw, 2) the jump and reach, 3) shuttle run, and 4) sit and reach. To eliminate instructor bias, impartial examiners were employed and the same examiners followed through, as much as possible, on the mid and post-tests.

Attitudes of students about Mastery Learning were determined by a questionnaire. Before the administration of the racquetball post-tests, each students was asked to answer questions to determine how Mastery Learning affected their attitudes toward instruction.

The study consisted of 12 weeks of training and instruction in basic racquetball strokes, rules, and strategy. Training consisted of two and a half hours a week of instruction for a total of 30 hours over the length of the study.

Both treatment groups learned the same skills in the same order. In the Mastery group, however, the instructor presented a new task only when 80% of the students had mastered a skill or task. This procedure was followed with each task for 12 weeks until the study was concluded.

Task sheets were used in the mastery class to monitor and implement this process. These sheets included the following:

1. The formal task objective which stated the mastery scores to be reached to pass the task and space to record test results.
2. Correctives for those who did not master the tests, enabling them to continue to practice.
3. Enrichment activities for those who had mastered a task allowing them to practice the skills in more depth.
4. Instructions on how to perform the task.

In the non-mastery class, skill achievement was not formally evaluated and new tasks were taught when they appeared on a pre-planned course outline. Student achievement of these skills did not dictate when new skills were introduced, as was the case in the Mastery class.

The statistical model which was used to evaluate the data collected as a result of the study was a two treatment by two gender by two aptitude by three trials repeated measures analysis of covariance. The covariate was based on the combined scores of the racquetball pre-tests.

The attitudes expressed by the students about Mastery Learning techniques were determined after separate t-tests were computed on each question from the attitude questionnaire. Where significance was found on a question, an ANOVA was computed to evaluate the attitudes of "high" and "low" students within each treatment group.

Results

The following results were found:

Both treatment groups improved significantly over the course of the training. At the post-test, the mastery group improved their performance by an average of 21 points, and the non-mastery group improved theirs by an average of 21.8 points.

A significant main effect due to treatment was evident at the mid-test. The Mastery group achieved significantly more than their non-mastery counter parts at the midtest. The Mastery group improved their performance by an average of 17.0 points and the non-mastery group improved theirs by an average of 10.4 points.

By the post-test, both groups were statistically equal. This was probably due to the fact that the non-mastery group practiced the basic skills, measured by the Mastery battery in non-structured play situations, while the Mastery group also practiced more advanced skills not measured by the battery. The non-mastery group had practiced these advanced skills earlier in the study.

This research study pointed out the impact of Mastery Learning for the low aptitude student. The low aptitude students in the Mastery group caught up to the high aptitude students in tests of achievement at the post-test with only one point separating their scores. At the mid-test the difference was four points. In the non-mastery class, these results were reversed. The low and high aptitude students scored exactly the same at the mid-test, but by the post-test the low aptitude students scored nine points less than the high aptitude students and lower than any other group.

When students were compared over the course of the study by gender, the same results were evident. Most of the low aptitude students were females, but the results clearly indicate that females benefit from Mastery Learning. In the Mastery group, the females scored an average of two points less than the males at the post-test. On the other hand, in the non-mastery class, the females scored an average of 13 points less than the males and 7 points less than the Mastery females.

The results of the attitude questionnaire indicated that the Mastery students were more negative than the non-mastery students when asked how they liked the

class and how they liked the way it was graded. These results were analyzed further to see if the high aptitude students felt differently than the low. The post hoc comparison showed that students in the Mastery group who were high, liked the grading procedures least of all, and the high non-mastery group apparently liked the grading procedures best. The low Mastery students were less favorable towards the grading procedures than the low non-mastery student.

Overall, the Mastery students were more negative than the non-mastery students in their responses on how they liked the class. This suggests that students need to be fully aware of the possibilities of a new learning methodology and care must be given to those students with the two extreme aptitudes. As student comments were evaluated, some of the high aptitude students felt a need to get in the game situation more. Some students felt a pressure when taking tests and some felt they practiced skills too much.

Conclusions

In view of the above results, the following conclusions seem warranted:

1. The conditions provided by Bloom's Mastery Learning model are effective for producing specific results quickly.
2. Low aptitude students, especially the low aptitude females benefit from the conditions provided by Mastery Learning methods.
3. The Mastery technique does produce some less than positive attitudes, but the results of motor performance would appear to outweigh the criticisms of the students. Perhaps more experience by the teachers in dealing with the mastery model can eliminate or reduce these criticisms by the students.

Recommendation

It is therefore recommended that more Mastery Learning research be conducted in physical education classes under similar conditions and with a variety of activities, realizing that Mastery Learning is an untapped source for improving learner achievement in physical education.

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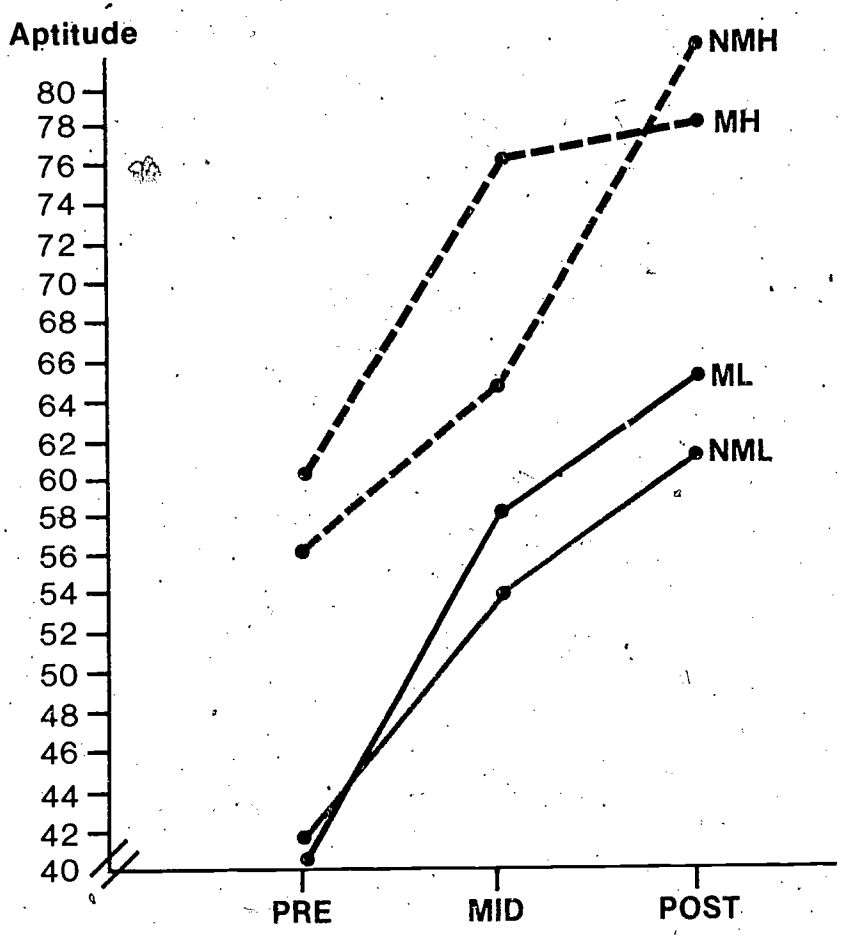
Achievement of students as Determined by Aptitude and Treatment

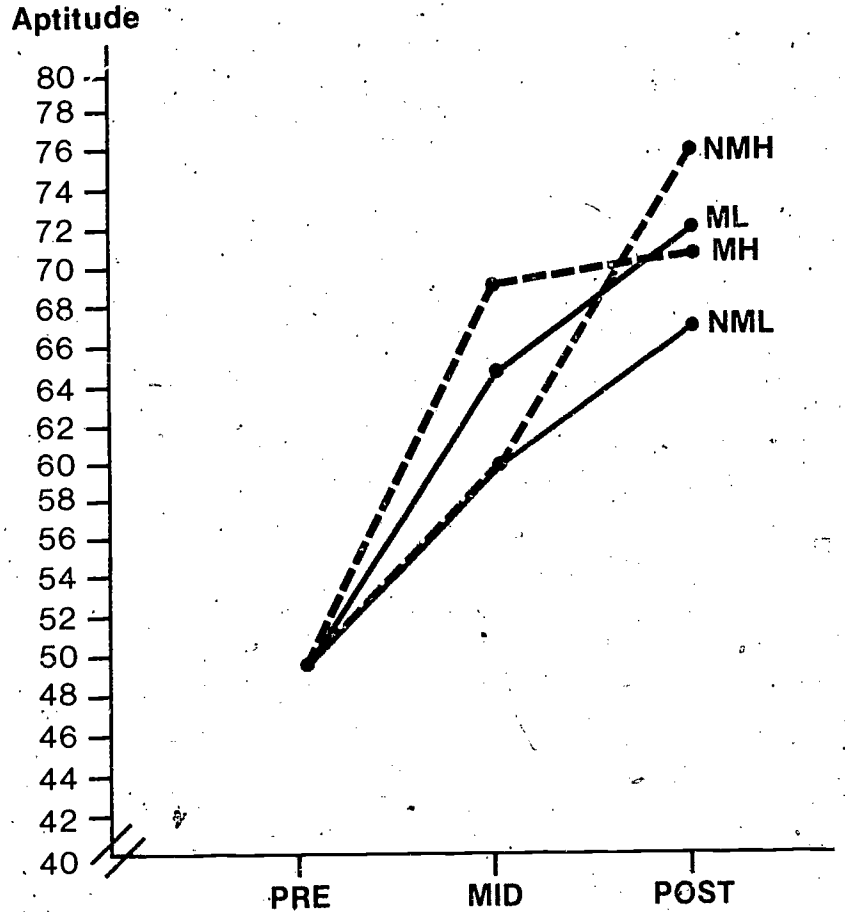
Unadjusted

ML	40	58	65
MH	60	76	78
NML	41	54	61
NMH	56	65	80

Adjusted

ML	50	65	72
MH	50	69	71
MML	50	60	67
NMH	50	60	76





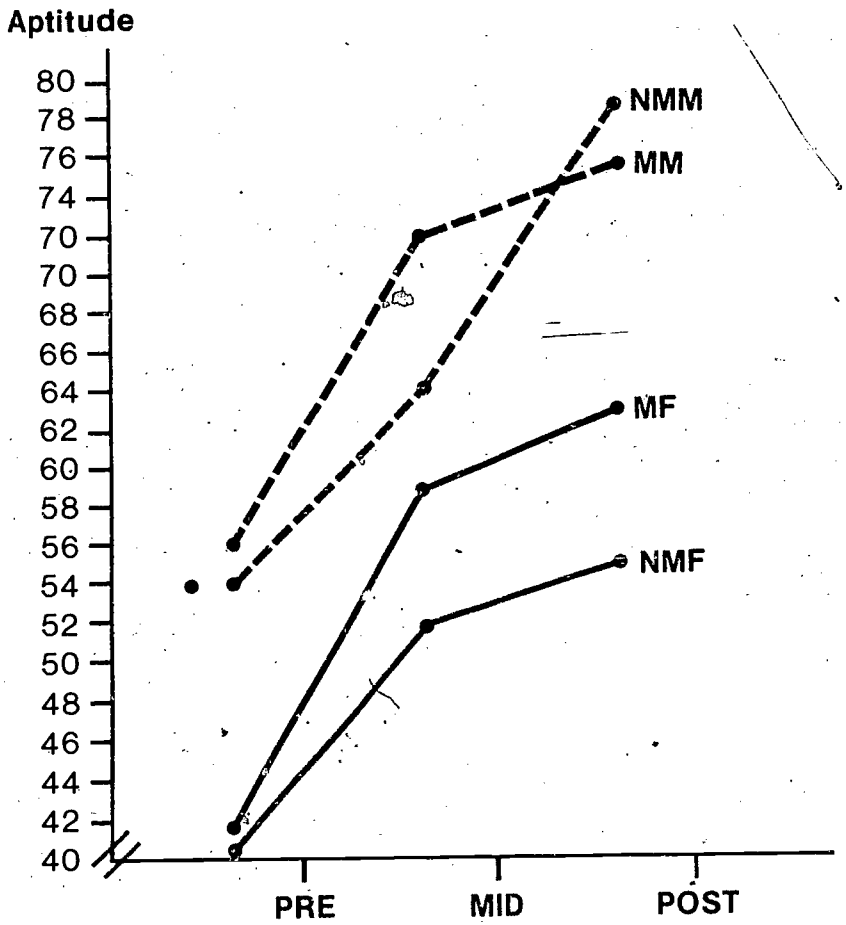
Achievement of students as determined by Gender & Treatment

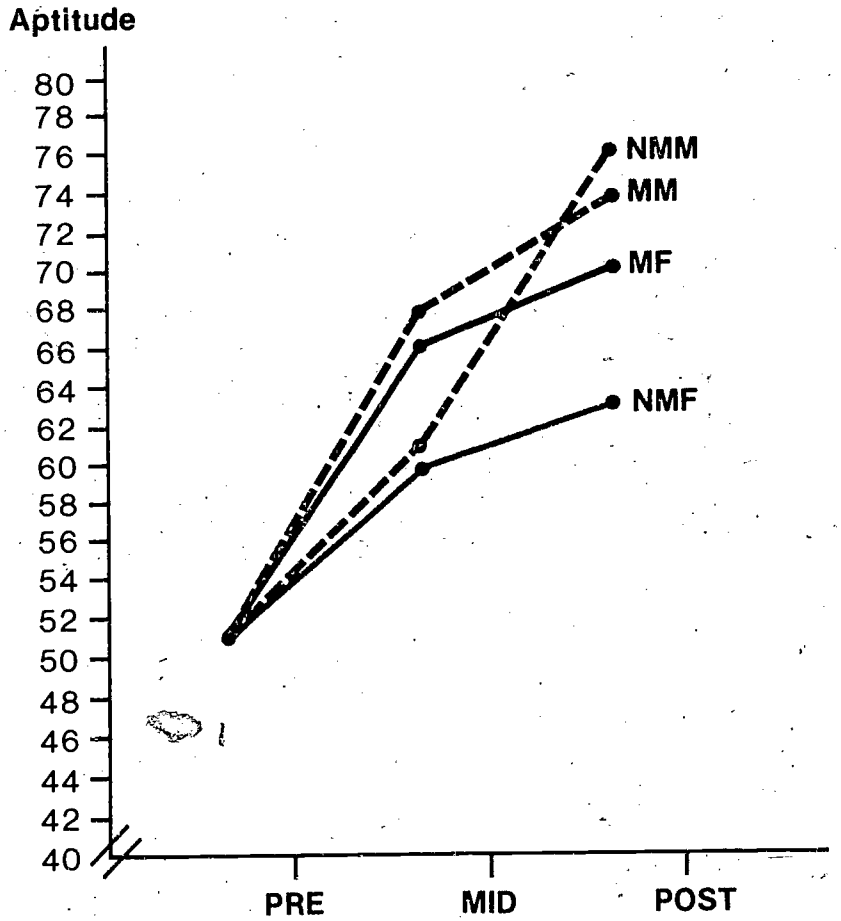
Unadjusted

NMM	54	64	79
MMF	39	52	55
MM	56	72	76
MF	40	59	63

Adjusted

NMM	50	61	76
NMF	50	60	63
MM	50	68	72
MF	50	66	70





Analysis of Covariance by Treatment, Gender and Aptitude

Source	df	MS	F	p
Between Subjects				
Treatment (A)	1	410.98	1.27	.2629
Gender (B)	1	198.46	.61	.4356
Aptitude (C)	1	147.71	.46	.5009
A X B	1	179.30	.55	.4585
A X C	1	.64	.00	.9645
B X C	1	53.52	.17	.6851
A X B X C	1	1.41	.00	.9474
Error Between	78	323.10		
Within Subjects				
Trials (D)	1	1574.16	10.88	.0015**
D X A	1	373.68	2.58	.1120
D X B	1	126.21	.87	.3531
D X C	1	23.71	.16	.6867
D X A X B	1	14.26	.10	.7543
D X A X C	1	277.55	1.92	.1699
D X B X C	1	172.36	1.19	.2783
D X A X B X C	1	87.19	.60	.4398
Error Within	79	144.64		

** .05

Attitude Differences Between Groups About the Way Racquetball Classes Were Taught

Question	Group	M	S.D.	t	p
1	Mastery	3.8	.98	-2.91	.005**
	Non-mastery	4.3	.60		
2	Mastery	3.4	1.18	-3.94	.000**
	Non-mastery	4.3	.64		
3	Mastery	4.3	1.10	-1.06	.290
	Non-mastery	4.5	.67		
4	Mastery	4.0	.96	0	1.000
	Non-mastery	4.0	.99		
5	Mastery	4.0	.98	-1.35	.181
	Non-mastery	4.2	.77		
6	Mastery	3.6	1.05	- .68	.497
	Non-mastery	3.8	.95		
7	Mastery	4.1	.82	.73	.465
	Non-mastery	4.0	.94		
8	Mastery	4.2	.80	1.57	.120
	Non-mastery	4.5	.70		
9	Mastery	4.6	.50	-1.10	.273
	Non-mastery	4.7	.47		

** .05