DOCUMENT RESUME

ED 213 702 SP 019 847

AUTHOR Guskey, Thomas R.; And Others
TITLE The Effectiveness of Mastery Learning Strategies in Undergraduate Education Courses.
PUB DATE Mar 82
NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Association (New York, NY, March, 1982).

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Education Courses; Education Majors; Feedback; Higher Education; *Mastery Learning; *Minimum Competencies; Preservice Teacher Education; Sex Differences; Student Attitudes; *Teaching Methods

ABSTRACT

This study was designed to assess the effectiveness of a group-based, teacher-paced model of mastery learning for instruction in undergraduate education courses. It was hypothesized that the mastery-taught students, who were provided formative tests and corrective activities, would achieve higher scores on the final examination and higher grades in the course than the control group. It was also hypothesized that the experimental group would demonstrate greater interest in their learning than the control group by attending class more regularly. Subjects were advanced sophomores or first semester juniors enrolled in six sections of a one-semester course dealing with topics in educational psychology and teaching exceptional children in the mainstreamed classroom. Fifty-five students constituted the mastery learning group, and the control group had 142 students. A series of formative tests were developed for the experimental group with accompanying feedback and corrective activities. Corrective work was completed outside of class by those students who did not attain 90 percent mastery on the formative tests. Although the course content, sequence of topics, activities, and group-based instruction were identical in all sections, only in the mastery learning sections were regular checks on learning progress coupled with corrective activities. At the end of the term, students in all sections were administered a common final examination. An analysis of the results indicated that the mastery group demonstrated higher levels of achievement than their peers trained in a typical lecture approach. The significantly fewer absences in the mastery learning group suggested that, concomitant with their superior achievement, these students were more interested in their coursework. (JD)

# The Effectiveness of Mastery Learning Strategies in Undergraduate Education Courses

Thomas R. Guskey

Center for the Improvement of Teaching and Learning
(On leave from the University of Kentucky)

Charlotte R. Clark and Jacques S. Benninga

University of Kentucky



Paper presented at the annual meeting of the
American Educational Research Association
New York City, NY, 1982.

## Abstract

This study was designed to determine the effectiveness of a group-based, teacher-paced Mastery Learning instructional model in undergraduate education courses. Two of six sections of a required education course were taught using Mastery Learning strategies. Data were gathered from 197 advanced undergraduate students enrolled in the course. Multivariate analysis of covariance showed that even after controlling for demographic and affective variables, students in Mastery Learning sections scored higher on a common final examination, attained higher course grades, and were absent less often than students in traditionally taught sections. Implications for teacher training and college-level instruction are discussed.

## The Effectiveness of Mastery Learning Strategies in Undergraduate Education Courses

For a decade and a half, the techniques of mastery learning have been applied at nearly every level of schooling, from elementary to postsecondary. Despite controversy and criticism, results of numerous studies have supported the basic philosophy of this approach to learning that asserts that nearly all students can master most of what they are taught given the appropriate conditions. Generally stated, the conditions are: 1) well-planned and executed instruction, 2) adequate time for students to learn the material, and 3) regular checks on learning with immediate feedback and methods for correction of inadequacies.

From this philosophy have emerged two somewhat diverse yet related models, both of which have been applied at the postsecondary level. The model most often used for college courses (Block and Burns, 1977) has been an individually-based one such as Keller's (1968) Personalized System of Instruction (PSI) in which students typically learn independently of each other and at their own pace. Although effective in many types of courses, the individually-paced model can be difficult to implement in courses where there is a fixed curriculum and fixed amount of classroom time (Block, 1974).

The second mastery learning model utilized at the postsecondary level is that outlined by Bloom (1968; 1971; 1976) and refined and elaborated upon by Block (1971; 1973) and Block and Anderson (1975). In this model, learning is

group-based and teacher -paced, but can also be student-paced. Objectives are clearly and specifically stated, and students are provided with regular diagnostic checks on their learning progress (feedback) by means of short "formative" tests that usually do not count toward a grade. Each test has specific corrective activities keyed to the text or other materials to provide remediation for inadequacies in learning. Grades are determined by "summative" exams such as a midterm and a final.

With the provision of carefully designed feedback and corrective activities, Bloom believed that 80 percent of students might reach the same high level of achievement attained by only 20 percent of students under more traditional approaches to instruction. This figure may seem somewhat ambitious at the postsecondary level. However, studies using Bloom's model at this level have reported significant differences in student achievement favoring the mastery approach over traditional lecture-test approaches (Block & Tierney, 1974; Guskey & Monsaas, 1979). Block and Burns (1977) noted another positive aspect of mastery learning; students typically exhibited less variability in their learning, that is, they learned more like one another than nonmastery-taught students. In addition to less variability, Guskey and Monsaas(1979) also noted less attrition among mastery-taught college students.

Bloom's model of group-based, teacher -paced mastery learning would appear to be well suited to much of postsecondary education since many

university courses are typically of a teacher-paced, lecture format. Despite the apparent suitability of this model, there is a dearth of published postsecondary studies dealing with its application. Virtually nothing is available that evaluates such an approach in undergraduate teacher education programs. One study in this area did use mastery learning in a summer session course, but the class was primarily student-paced (Bauman, 1980). With increasing demands for accountability among teachers, there is a great need for demonstrated mastery of competencies in education. Although mastery learning is not a panacea, it may be a step in the right direction for preparing students to demonstrate these competencies, since a predictable outcome of the approach is increased learning and more enthusiasm toward learning (Guskey, 1980).

This study was designed to assess the effectiveness of a group-based, teacher-paced model of mastery learning for instruction in undergraduate education courses. We predicted that the mastery-taught students, who were provided formative tests and corrective activities, would achieve higher scores on the final examination, and would receive higher grades in the course than the control group. In addition, we predicted that the experimental group would demonstrate greater interest in their learning than the control group by attending class more regularly.

## Method

Subjects were 197 undergraduate education majors at a large southern university. Of this number, 55 constituted the experimental or mastery learning group and 142, the control group. The students were primarily advanced sophomores or first semester juniors enrolled in six sections of a one semester course dealing with topics in educational psychology and special education as they related to teaching exceptional children in the mainstream of education. The classes, each taught by a different instructor, were of an instructor-paced, lecture format.

Two of the instructors volunteered to implement mastery learning strategies in their classes. Together they developed a series of formative tests with accompanying feedback and corrective activities, and administered these measures following instruction on each unit in the course. Corrective work was completed outside of class by those students who did not attain 90% mastery on the formative tests. Each formative test or its corrective, counted as one point toward a subject's final grade. Although the course content, sequence of topics, activities, and group-based instruction were identical in all sections, only in the two mastery learning sections were regular checks on learning progress coupled with corrective activities.

At the beginning of the semester, all students were presented a detailed set of common course objectives and were informed that their final examination would be based upon those objectives. They were then group-administered:

1) a 20-item multiple choice pretest on the course content to determine if there were differences in entry level knowledge; 2) a seven-item rating scale designed to measure academic self-concept; and, 3) a 15-item rating scale measuring affect toward education. Demographic data were also collected on students' age, sex, and class placement (sophomore, junior, etc.). In addition, each instructor kept careful records of class attendance throughout the semester. At the end of the term, students in all sections were administered a common final examination. None of the items was identical to any item on the formative tests administered to the experimental group. Because course grades were based upon several criteria in addition to final examination scores, the course grade attained by each student was also included as part of the data.

## Results and Discussion

The data were first analyzed by computing means and standard deviations on the various measures for mastery and control classes. These are shown in Table 1. Tests of differences between these means indicated that there were no statistically significant differences between the two groups of classes in terms of entry knowledge of course content, academic self-concept, or affect toward education. However, differences in final test scores, course grades, and number of class absences were statistically significant. On the average, students in the mastery classes attained higher scores on the final test, received higher course grades, and had fewer absences than students in classes taught by more traditional methods.

Insert Table 1 about here

Correlations computed between the various student measures are illustrated in Table 2. These show several interesting interrelations. As might be expected, pretest scores were related to both final test scores and final grades. They were also related to measures of academic self-conoept, indicating that students with greater entry level knowledge of the course content were also more confident of their academic abilities.

Insert Table 2 about here

Surprisingly, sex was strongly related to many of the measures. Correlations indicated that female students expressed greater academic self-confidence and more positive attitudes about education, attained higher final test scores and course grades, and were absent less often, than were male students. Academic self-concept measures were found to be related to affect toward education, final test scores, and final grades. The strong intercorrelations among final test scores, final grades, and number of absences were also expected.

To explore the effects of the use of mastery learning more precisely, a multivariate analysis of covariance was conducted comparing mastery learning

and traditionally-taught class sections. Sex, academic self-concept, and affect toward education were employed as covariants; final test scores, final grades, and number of absences were the three dependent measures. Results of this analysis are shown in Table 3. The effects of both sex and academic self-concept were statistically significant. However, the overall effect of affect toward education was not statistically significant after the effects of sex and self-concept were removed. The effect of the treatment, mastery learning, was found to be statistically significant even after controlling for the influence of these other student variables. Students in mastery classes attained higher final examination scores, received higher course grades, and were absent less often than students in classes taught by more traditional methods.

Insert Table 3 about here

To futher explore the effects of the mastery learning, separate correlations were computed among the variables for the mastery and control classes. These correlations are illustrated in Table 4. It is interesting to note that while pretest scores were significantly correlated with final test scores among students in the traditionally-taught classes (r=.356), this correlation is near zero in the mastery classes (r=.099). Similarly, sex and academic self-concept were strongly related to final test performance

in the traditionally-taught classes, but were near zero in the mastery classes. This is precisely what would be predicted by mastery learning theory. That is, as instruction becomes more effective, the influence upon final achievement of students' initial aptitude and affective characteristics will diminish.

Insert Table 4 about here

The results clearly confirmed our predictions that preservice teachers trained in a teacher-paced, group-based model of mastery learning would demonstrate higher levels of achievement than their peers trained in a typical lecture approach. The significantly fewer absences in the mastery learning group suggest that concommitant with their superior achievement, these students were more interested in their coursework than the control students.

Although the findings indicated strong differences favoring females in this study, the advantage diminished almost completely in the mastery approach. This suggests that individual differences in learning were met in the experimental group but not in the control group.

The data strongly support the findings of numerous mastery learning studies, and have several implications for teacher training and other areas of postsecondary education. Through the provision of frequent feedback and correctives, the mastery approach affords better opportunities for

students to learn. In addition, preservice teachers experience an approach to individualizing instruction that they themselves should be able to apply once in the field. This is an extremely important teacher skill especially with the increased demand for individualization for mainstreamed handicapped children.

With demands for accountability and higher quality of instruction now being made at all levels of education, mastery learning theory offers a unique strategy for improved instruction and learning. The teacher paced, group-based model can be easily superimposed on the traditional lecture format actually affording little or no change in the way a course is taught.

## References


Bauman, D. L. A mastery learning model applied to an undergraduate course in teacher education: A case study. Unpublished doctoral dissertation, University of Alabama, 1980.

Block, J. H. (Ed.), Mastery learning: Theory and practice. New York: Holt, Rinehart and Winston, 1971.

Block, J. H. Teachers, teaching and mastery learning. Today's Education, 1973, 63, 30-36.

Block, J. H. (Ed.), Schools, society, and mastery learning. New York: Holt, Rinehart and Winston, 1974.

Block, J. H., & Anderson, L. W. Mastery learning in classroom instruction. New York: Macmillan, 1975.

Block, J. H., & Burns, R. B. Time in school learning: An instructional psychologist's perspective. Paper presented at the annual meeting of the American Educational Research Association, Washington, D. C., March-April, 1975.

Block, J. H., & Tierney, M. An exploration of two correction procedures used in mastery learning approaches to instruction. Journal of Educational Psychology, 1974, 66, 962-967.

Bloom, B. S. Learning for mastery. (UCLA -CSEIP) Evaluation Comment, 1968, 1, 2.

Bloom, B. S. Mastery learning and its implications for curriculum development. In E. W. Eisner (Ed.), Confronting curriculum reform. Boston: Little, Brown, 1971.

Bloom, B. S. Human characteristics and school learning. New York: McGraw-Hill, 1976.

Guskey, T. R. Individualizing within the group-centered classroom: The mastery learning model. Teacher Education and Special Education, 1980, 3, 47-54.

Guskey, T. R., & Monsaas, J. A. Mastery learning: A model for academic success in urban junior colleges. Research in Higher Education, 1979, 11, 263-274.

Table 1

Means and Standard Deviations of Student Variables by Treatment Group

| Variables | Mastery (n=55) | | Control (n=142) | |
|---|---|---|---|---|
| | $\bar{X}$ | (SD) | $\bar{X}$ | (SD) |
| Pretest | 11.16 | (2.42) | 10.77 | (2.37) |
| Self-Concept | 26.61 | (3.39) | 26.81 | (2.96) |
| Affect | 59.87 | (7.46) | 58.96 | (6.70) |
| Final Test | 26.39* | (2.64) | 23.69 | (4.48) |
| Grade | 4.52* | ( .62) | 4.21 | ( .92) |
| Absences | 3.15* | (3.77) | 4.57 | (3.73) |

*P< .05 for difference between Mastery and Control Groups

Table 2

Intercorrelations Among Student Variables

(n=197)

| Variables | Pretest | Sex | Self-Concept | Affect | Final Test | Grade | Absences |
|---|---|---|---|---|---|---|---|
| Pretest | 1.000 | .054 | .223** | .007 | .232** | .191* | -.102 |
| Sex | | 1.000 | .371** | .449** | .283** | .247** | -.356** |
| Self-Concept | | | 1.000 | .478** | .305** | .201* | .020 |
| Affect | | | | 1.000 | .142 | .104 | -.010 |
| Final Test | | | | | 1.000 | .767** | -.448** |
| Grade | | | | | | 1.000 | -.567** |
| Absences | | | | | | | 1.000 |

*p< .05

**p< .01

Table 3

Summary of Multivariate Multiple Regression Analysis

| Source of Variation | df | Multivariate F-Statistic | Univariate F-Statistics | | |
|---|---|---|---|---|---|
| | | | Final Test | Grade | Absences |
| Sex | 1 | 3.82** | 6.33** | 5.16** | 0.29 |
| Self-Concept (SC) eliminating sex | 1 | 3.35* | 5.28** | 4.44* | 0.74 |
| Affect (AFF) eliminating sex & SC | 1 | .61 | 1.17 | 1.47 | 4.47** |
| Treatment eliminating sex, SC & AFF | 1 | 4.87** | 5.28** | 0.07 | 3.49* |
| Residual | 192 | Mean Squares | 16.54 | .59 | 12.97 |

*p< .05

**p< .01

Table 4

Intercorrelations Among Student Variables by Treatment Group

| Variables | Pretest | Sex | Self Concept | Affect | Final Test | Grade | Absences |
|---|---|---|---|---|---|---|---|
| Pretest | | -.154 | .077 | -.067 | .099 | .163 | .168 |
| Sex | .057 | Mastery | | .448** | -.036 | -.060 | .130 |
| Self-Concept | .247* | .286** | | .333* | .084 | .144 | .324* |
| Affect | .079 | .267* | .648** | Control | -.247 | -.335* | .144 |
| Final Test | .356** | .289** | .338** | .020 | | .682** | -.340* |
| Grade | .088 | .287** | .302** | .065 | .772* | | -.349* |
| Absences | -.229 | .253* | .058 | .279* | -.188 | -.207 | |

*p <.05

**p <.01