Comparison Of Teacher-Directed And Student-Directed Methods Of Using Comprehensive Achievement Monitoring Feedback In Psychomotor Gymnastics Skills Of Ninth-Grade Girls.

Carla Margaret Crippen
University of the Pacific

Follow this and additional works at: https://scholarlycommons.pacific.edu/uop_etds
Part of the Education Commons

Recommended Citation
https://scholarlycommons.pacific.edu/uop_etds/3013

This Dissertation is brought to you for free and open access by the Graduate School at Scholarly Commons. It has been accepted for inclusion in University of the Pacific Theses and Dissertations by an authorized administrator of Scholarly Commons. For more information, please contact mgibney@pacific.edu.
COMPARISON OF TEACHER-DIRECTED AND
STUDENT-DIRECTED METHODS OF USING
COMPREHENSIVE ACHIEVEMENT MONITORING
FEEDBACK IN PSYCHOMOTOR GYMNASTICS
SKILLS OF NINTH GRADE GIRLS

A Dissertation
Presented to
the Graduate Faculty of the
University of the Pacific

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
Carla M. Crippen
May, 1976
This dissertation, written and submitted by

Carla M. Crippen

is approved for recommendation to the Committee on Graduate Studies, University of the Pacific

Dean of the School or Department Chairman:

Oscar Jamieson

Dissertation Committee:

Carl D. Lang  Chairman

Bekley P. Hopkins

Shirley M. Jennings

Lee Christian

Cedric W. Deming

Dated April 26, 1976
COMPARISON OF TEACHER-DIRECTED AND STUDENT-DIRECTED METHODS OF USING COMPREHENSIVE ACHIEVEMENT MONITORING FEEDBACK IN PSYCHOMOTOR GYMNASTICS SKILLS OF NINTH GRADE GIRLS

Abstract of the Dissertation

PURPOSE: The purpose of this study was to assess the effectiveness of Comprehensive Achievement Monitoring (CAM), using teacher-directed diagnosis of feedback in promoting achievement in girls' gymnastics as compared to using Comprehensive Achievement Monitoring (CAM) with student-directed use of feedback. Focusing on performance objectives in four areas of girls' and women's gymnastics - the balance beam, the uneven parallel bars, the vault (horse), and tumbling - a measurement instrument was constructed, and feedback methods were used to enhance student learning.

A computer-assisted evaluation program, Comprehensive Achievement Monitoring (CAM), was adapted to the structure of the psychomotor instrument. This was a pioneer effort in using the CAM system to evaluate psychomotor performance objectives in a physical education activity.

METHODOLOGY: This study was conducted in a high school in Northern California. The forty-six subjects who encompassed the entire ninth grade female population attending the high school were randomly assigned to the experimental or control class. Four testing periods were established in an effort to obtain pretest, immediately after instruction, retention, and posttest information. Performance objectives or test items were measured by the teachers on a pass or an unachieve basis.

All subjects received the feedback results concerning individual achievement as well as verbal instructions on the method of feedback interpretation. The specific use of the CAM feedback constituted the difference between the experimental and the control group. In the experimental group, the students experienced teacher-directed use of feedback. The teacher diagnosed the results in terms of identifying those objectives which a student did not pass on the previous test. Objectives were then retaught using alternative teaching strategies and methods of class organization.

The control group was involved with CAM through the student-directed use of feedback. After students examined the feedback results, the teacher functioned as the resource person. Students who were interested sought the help of the teacher or a knowledgeable class member.

Statistical analysis employed was a two-by-two analysis of covariance with methods of using the CAM feedback and the socio-economic level serving as two dichotomous independent factors. This procedure accommodated the examination of the data for a potential interaction of the experimental variable with socio-economic level and provided maximum power to detect a treatment effect. The covariate, pretest performance, served as a control for differences in gymnastics proficiency prior to the experiment.

In order to ascertain the nature of the treatment effect, an analysis of the individual test items was performed using the chi-square procedure.

CONCLUSIONS: 1) The teacher-directed use of feedback was significantly more effective than student-directed use of feedback.

2) A significant interaction resulted between the treatment and the socio-economic level indicating that the effectiveness of the teacher feedback treatment versus the control was somewhat dependent on which socio-economic group was involved. The teacher-directed use of feedback was especially effective in the lower socio-economic group as compared to the lower socio-economic student-directed use of feedback group.

3) The teacher-directed use of feedback versus the control treatment produced highly significant effects on four different skills.

RECOMMENDATIONS: 1) Depth studies should be conducted to explore the use of CAM to measure skill and knowledge in the cognitive, affective and psychomotor domain.

2) Research should be conducted to structure the CAM tool to measure the skill of the intermediate and advanced performer.

3) Investigations should be conducted concerning the adaptation of CAM to judging the competitive area of girls' and women's gymnastics.
# TABLE OF CONTENTS

LIST OF TABLES AND FIGURES ............................................. vii

Chapter

1. INTRODUCTION.......................................................... 1
   The Problem............................................................. 9
   Statement of the Problem............................................ 9
   Significance of the Study........................................... 9
   Purpose of the Study................................................. 10
   Research Methodology............................................... 10
   Assumptions and Limitations........................................ 11
   Assumptions............................................................ 11
   Limitations............................................................. 11
   Definition of Terms................................................ 12
   Summary............................................................... 14

2. REVIEW OF THE LITERATURE......................................... 15
   Introduction........................................................... 15
   Use of Feedback in General Education......................... 15
   Teacher Effectiveness As Related
      To Feedback........................................................ 16
   Effect of Classroom Atmosphere on Feedback............... 16
   Feedback and Improvement in Teacher Performance........ 19
   Curriculum Design As Related to Feedback .................. 24
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Performance Objectives</td>
<td>24</td>
</tr>
<tr>
<td>Mastery Learning and Feedback</td>
<td>25</td>
</tr>
<tr>
<td>Use of Educational Media in Feedback</td>
<td>28</td>
</tr>
<tr>
<td>Use of Feedback in Physical Education and Gymnastics</td>
<td>32</td>
</tr>
<tr>
<td>Teacher Effectiveness As Related to Feedback</td>
<td>33</td>
</tr>
<tr>
<td>Student Achievement As Related to Feedback to Students</td>
<td>34</td>
</tr>
<tr>
<td>Curriculum Design As Related to Feedback</td>
<td>35</td>
</tr>
<tr>
<td>Use of Performance Objectives</td>
<td>35</td>
</tr>
<tr>
<td>Use of Educational Media in Feedback</td>
<td>38</td>
</tr>
<tr>
<td>Use of Feedback as a Result of Comprehensive Achievement Monitoring</td>
<td>40</td>
</tr>
<tr>
<td>Advantages and Disadvantages of Comprehensive Achievement Monitoring</td>
<td>41</td>
</tr>
<tr>
<td>Courses Monitored by CRAM or CAM</td>
<td>45</td>
</tr>
<tr>
<td>Summary</td>
<td>50</td>
</tr>
<tr>
<td>3. PROCEDURE</td>
<td>53</td>
</tr>
<tr>
<td>Population and Subjects</td>
<td>53</td>
</tr>
<tr>
<td>Development of Comprehensive Achievement Monitoring</td>
<td>56</td>
</tr>
<tr>
<td>Measuring Instrument</td>
<td>57</td>
</tr>
<tr>
<td>Development of Instrument</td>
<td>57</td>
</tr>
<tr>
<td>Test Items</td>
<td>58</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Pilot Study</td>
<td>58</td>
</tr>
<tr>
<td>Inter-Rater Reliability Check</td>
<td>58</td>
</tr>
<tr>
<td>Experimental Procedure</td>
<td>61</td>
</tr>
<tr>
<td>Evaluation Design</td>
<td>61</td>
</tr>
<tr>
<td>Instructional Calendar and Log</td>
<td>62</td>
</tr>
<tr>
<td>Item Matrix</td>
<td>63</td>
</tr>
<tr>
<td>Class Assignment</td>
<td>63</td>
</tr>
<tr>
<td>Test Administration</td>
<td>63</td>
</tr>
<tr>
<td>Teaching Strategies</td>
<td>64</td>
</tr>
<tr>
<td>Teacher-Directed Feedback</td>
<td>65</td>
</tr>
<tr>
<td>Student-Directed Feedback</td>
<td>65</td>
</tr>
<tr>
<td>Individual Projects</td>
<td>66</td>
</tr>
<tr>
<td>Gathering of Data</td>
<td>67</td>
</tr>
<tr>
<td>Processing of Data</td>
<td>67</td>
</tr>
<tr>
<td>Data Forms</td>
<td>68</td>
</tr>
<tr>
<td>Analysis of Data</td>
<td>68</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>68</td>
</tr>
<tr>
<td>Statistical Treatment of Data</td>
<td>68</td>
</tr>
<tr>
<td>Analysis of Covariance</td>
<td>68</td>
</tr>
<tr>
<td>Chi-Square</td>
<td>70</td>
</tr>
<tr>
<td>Summary</td>
<td>71</td>
</tr>
<tr>
<td>4. ANALYSIS OF THE DATA</td>
<td>72</td>
</tr>
<tr>
<td>Treatment Effect on Total Test Scores</td>
<td>72</td>
</tr>
<tr>
<td>Treatment Effect on Items of Test</td>
<td>76</td>
</tr>
</tbody>
</table>
# CONCLUSIONS BASED UPON THE INVESTIGATION AND RECOMMENDATIONS FOR FURTHER STUDY

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. CONCLUSIONS BASED UPON THE INVESTIGATION AND RECOMMENDATIONS FOR FURTHER STUDY</td>
<td>83</td>
</tr>
<tr>
<td>Conclusions Drawn From the Investigation</td>
<td>83</td>
</tr>
<tr>
<td>Statistical Conclusions</td>
<td>83</td>
</tr>
<tr>
<td>Informal Observations</td>
<td>84</td>
</tr>
<tr>
<td>Conclusions Concerned With Trends</td>
<td>86</td>
</tr>
<tr>
<td>Recommendations for Further Study</td>
<td>87</td>
</tr>
<tr>
<td>Summary</td>
<td>88</td>
</tr>
</tbody>
</table>

## BIBLIOGRAPHY

90

## APPENDIXES

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Gymnastics Test Instrument</td>
<td>99</td>
</tr>
<tr>
<td>B. Psychomotor Objectives/Test Items Included in Each Test Administration</td>
<td>124</td>
</tr>
<tr>
<td>C. Skill Rating Sheet (Used in Study)</td>
<td>126</td>
</tr>
<tr>
<td>D. Daily Instructional and Teacher Rotation Calendar</td>
<td>127</td>
</tr>
<tr>
<td>E. CAM Teacher Log</td>
<td>131</td>
</tr>
<tr>
<td>F. Summary of Instructional Log Information</td>
<td>132</td>
</tr>
<tr>
<td>G. Skill Rating Sheet (Used in Inter-Rater Reliability)</td>
<td>137</td>
</tr>
<tr>
<td>H. Item Matrix Form</td>
<td>138</td>
</tr>
<tr>
<td>I. Individual Student Computer Feedback</td>
<td>139</td>
</tr>
</tbody>
</table>
Chapter

J. Teacher Summary Computer Feedback ............... 140

K. Group Summary Computer Feedback ............... 141

AUTOBIOGRAPHICAL STATEMENT .......................... 143
LIST OF TABLES AND FIGURES

Table                      Page
1. Demographic Comparison Between East Palo Alto and San Mateo County...................... 55
2. Comparison of Number of Correct Responses for Teacher-Directed Use of Feedback (Experimental) and Student-Directed Use of Feedback (Control) Using the Psychomotor Testing Instrument on Ninth Grade Girls Attending Ravenswood From October-December, 1972........................ 74
3. Analysis of Covariance to Compare Gains in Psychomotor Scores in Teacher-Directed Use of Feedback (Experimental) and Student-Directed Use of Feedback (Control).............................. 77
4. Comparison of Percentage Gainers of Teacher-Directed Use of Feedback (Experimental) and Student-Directed Use of Feedback (Control) By Chi-Square Analysis.............................. 79

Figure
1. Gain in Psychomotor Scores in Experimental and Control Groups at Two Socio-Economic Levels... 75
Chapter I

INTRODUCTION

Education is charged with the responsibility of contributing meaningfully to the solutions of the problems of living in the world today. Preserving the culture, yet playing an innovative role, and keeping abreast of the most sweeping changes the world has ever known, offers a challenge to the entire education profession.¹

In addition to imparting relevant information to the student, education must face the growing public concern for greater educational accountability. In California, as in other states, there is an increasing reluctance on the part of the public to respond favorably to continued requests for more revenue for education. There is a concern that increased funds do not seem to be producing better educational results. Thus, the aims of education as well as measurement of those aims need to be examined.²


Although the general aim of education as advocated by the Educational Policies Commission was established in 1958, it still seems an appropriate goal. The Commission stated, "the general end of education in America at the present time is the fullest possible development of the individual within the framework of our present industrialized democratic society."³

In 1928, the Commission on the Reorganization of Education indicated that "education should contribute to the health, command of fundamental processes, worthy home membership, vocational efficiency, citizenship, worthy use of leisure time and the ethical character of the individual."⁴ The foregoing principles of health and the worthy use of leisure time are developed in physical education. Physical education, an important part of the educational process, has as its unique aim the "optimum development, integration and adjustment physically, mentally and socially of the individual through guided instruction and participation in sports, gymnastics and


dance activities."\(^5\)

Charles Bucher has stated that "physical education should develop physically, mentally, emotionally and socially fit citizens through the medium of physical activities that have been selected with a view to realizing these outcomes."\(^6\) Physical education contributes to the development of the "whole" person through stressing the importance of an inquiring mind as well as reading, writing and speaking skills, and factual information concerning health and disease. These are seen as complementary forms of a more general process: the education of the individual. Skill as a participant or a spectator in sports, dance or gymnastics as well as the development of physical and mental pursuits in leisure can be furthered through physical education. Lastly, physical education can stimulate the ability of the individual to purposefully direct one's life through activity.\(^7\)

Physical education has a unique approach to the education of the individual. Thus, programs are designed to coordinate and foster the physical, socio-emotional and intellectual development of the individual so that he is


\(^7\)Ibid., p. 157.
better able to approach life's problems. Through this three-pronged approach, necessitating careful melding of various activities into a meaningful whole, a substantial contribution is made toward the total education of the individual as he progresses through situations involving himself and others. 8

Many educators agree that the ultimate index of the worth of an educational program is the degree to which it benefits the learner. How do educators know that the educational experience is helping the student? How do we know the degree to which a physical education program benefits the learner? The educator must use the process of evaluation to come to an appropriate conclusion. 9

Evaluation and measurement are universal practices. They reflect man's curiosity about his environment and concern for himself. "Evaluation is the act of judgment scientifically applied according to predetermined standards." 10 Measurement is a technique of evaluation which makes use of procedures which are generally precise and objective. When using these procedures, quantitative data


10 Harrold M. Barrow and Rosemary McGee, A Practical Application to Measurement in Physical Education (Phila-
will result in numerical form. An important purpose of measurement and evaluation is to identify and recognize those needs which will assist in designing an educational program for the individual. Student differences can be translated into needs when they have been revealed by measurement.

The approach to measurement in physical education should be that of improving the educational service to each student. Thus, the primary function of the physical education teacher is to understand the special needs of the student in an effort to give him effective guidance through an individualized program. By using measurement and diagnosing the feedback, the physical educator can provide an enriching learning experience, hastening the growth of the student. Ultimately, a sound measurement program makes teaching more concrete and is, itself, a highly effective teaching device.

One of the most effective measurement and teaching devices is the test. Most tests are given as a summation to a unit of learning. Often tests are administered automatically and do not follow naturally from the course

---

11 Ibid., p. 20.
12 Ibid., p. 10.
objectives. Clarke has indicated that no testing project should be undertaken unless it is part of an attack on a clearly defined educational problem. Tests should not be given for the sake of testing. The justification for the administration of tests is that the feedback generated from the information is used for teaching, program and school modification to better meet the individual needs of each student.\(^{14}\)

The significance of feedback in the acquisition of behavioral skills is supported by Bilodeau and Bilodeau's exhaustive analysis of experimentation dealing with this concept:

Studies of feedback or knowledge of results show it to be the strongest, most important variable controlling performance and learning. It has been shown repeatedly that there is no improvement without feedback, and learning deteriorates after its withdrawal. No other independent variable offers the wide range of possibilities for getting man to repeat, or change his responses immediately or slowly, by small or large amounts.\(^{15}\)

Deese and Hulse state that there "seems to be universal agreement among those who study the learning of skills that the most fundamental condition determining

\[^{14}\text{Ibid.}, \ p. \ 10.\]

performance during learning is feedback." More recently, the two researchers have combined the functions of feedback into informing the learner about his responses on the next trial and providing reinforcement.17

In further support of the educational merit of feedback, studies of psychomotor learning have stressed the importance of providing the learner with specific and immediate knowledge of his performance. The student utilizes the feedback to understand his progress, while the teacher may examine the feedback to evaluate the effectiveness of the instruction. Feedback, in the form of knowledge, has been found to be significant in the development of proficiency in tasks requiring a high degree of accuracy.18

A review of the literature concerning measurement and the use of feedback in physical education indicates that authorities advocate the use of measurement and the resulting information, the feedback. The notion of measuring the attainment of performance objectives in physical education seems to have wide-spread acceptance.19

---

17 Ibid.
19 Barrow, p. 23.
Nixon has stressed the importance of generating and using feedback to strengthen the physical education program. He indicated that feedback was the most important component in the educational process.\(^{20}\)

However, there appears to be a gulf between the recommendations of experts in physical education and the practicing physical educator. Rarely have physical education teachers stated performance objectives prior to presenting the material. When measurement is used to assess performance, feedback is reflected only in the final grade a student receives. Opportunities to use information from the measurement for further skill development are overlooked.\(^{21}\)

The physical education activity of gymnastics, because of its universally accepted performance criteria, lends itself to a structured evaluation program. However, a review of the literature revealed there were no evaluation programs in gymnastics designed for girls and women at the secondary school level.

\(^{20}\) Statement by John E. Nixon, Professor of Physical Education and Education, personal interview, Stanford, California, October 26, 1975.

\(^{21}\) Nixon and Locke, loc. cit.
THE PROBLEM

Statement of the Problem

Do ninth grade girls who participate in the teacher-directed diagnosis of feedback program achieve higher psychomotor scores in gymnastics than do those girls who participate in the control group experiencing student-directed use of feedback?

Significance of the Study

The importance of a Comprehensive Achievement Monitoring (CAM) model in gymnastics could lead to a heightened awareness of student potentials in other physical education curricula as well as gymnastics.

Feedback is an important by-product of the CAM tool. The methods of teacher use (teacher-directed) and student use (student-directed) of the feedback are examined in this research study. This research paper could stimulate the teacher to make effective use of learning feedback in structuring reteaching sessions geared to individual needs of the student.

Other significant aspects of the study include:

1. Surprisingly little research has been done in the area of evaluation of gymnastics skills of high school girls.

2. A psychomotor testing instrument was needed in a ninth grade girls' gymnastics program.

3. This is a pioneer attempt at adapting the CAM model for psychomotor measurement.
4. The research involved the use of the computer and teacher analysis (teacher-directed) and student involvement (student-directed) of the feedback for further learning.

5. This study could be adapted to other areas of physical education using the gymnastics model, for other grades, and for both sexes.

PURPOSE OF THE STUDY

The purpose of this study was to assess the effectiveness of Comprehensive Achievement Monitoring (CAM), using teacher-directed diagnosis of feedback in promoting achievement in girls' gymnastics as compared to using Comprehensive Achievement Monitoring (CAM) with student-directed use of feedback.

RESEARCH METHODOLOGY

This study was conducted in the fall of 1972, and included two classes of ninth grade girls at Ravenswood High School in East Palo Alto, California. A total study sample of forty-six students was randomly divided, according to registration order, into an experimental and control group with a pretest-posttest design.

Both the experimental and control groups received the Comprehensive Achievement Monitoring treatment. The use of the CAM feedback as generated by the computer constituted the difference between the two groups. The experimental group experienced teacher-directed use of the feedback. The control group was involved with the student
use of the feedback, labeled student-directed use.

In the research study, the data were analyzed using analysis of covariance procedures of the total posttest scores. The chi-square statistic was used for analyses of the individual objectives or test items.

ASSUMPTIONS AND LIMITATIONS

Assumptions

The results of this study rest on the following assumptions:

1. The time of day the samples were taken would have no effect on the outcome of the tests.

2. The students who participated in this study were representative of the girls of the freshmen population.

3. The teachers who participated in this study were a representative sample of the larger population of physical education teachers who may implement this study.

4. Eleven weeks would be a sufficient time to allow the effects of this program to be detected.

5. Comprehensive Achievement Monitoring (CAM) is an effective tool for individualizing instruction and yielding individualized feedback.

6. The two methods of feedback usage, teacher-directed and student-directed, are representative of the total possibilities of feedback usage.

Limitations

The limitations of the study are:

1. Specific performance objectives were measured in the psychomotor area of learning only.

2. The study sample was limited to the population of East Palo Alto, California, and volunteer
students from the other communities in the Sequoia Union High School District, located in southern San Mateo County, California.

3. The age level was limited to the freshmen girls enrolling at Ravenswood High School in the fall of 1972.

4. The sample size was limited to forty-six girls enrolling as freshmen students in the fall of 1972.

5. The study included only the freshmen girl population at Ravenswood in the fall of 1972.

6. Feedback generated by the use of the Comprehensive Achievement Monitoring tool was utilized by the teacher to restructure instruction or by the student indicating an interest in achieving more objectives.

DEFINITION OF TERMS

The following definitions of terms have been accepted by the author to provide a common basis of understanding to the reader.

1. Comprehensive Achievement Monitoring (CAM): A systematic method for continued record of student learning prior to the instruction, during the instruction, and after the instruction has taken place.23

2. Criterion-Referenced Testing: A measurement of student performance against a predetermined standard.24


3. **Feedback**: A process whereby the individual gains information concerning the correctness of his previous response in order that he can adjust his behavior to compensate for errors; it is more inclusive than the knowledge of results which it is tending to replace.25

4. **Diagnosis**: An educational determination of the nature of learning difficulties and deficiencies.26

5. **Gymnastics**: A physical education activity concerned with the events of vaulting (horse), uneven parallel bars, balance-beam, and free exercise or tumbling.27

6. **Monitor**: The test used for evaluation of the objectives.28

7. **Instruction Completed Data**: Information indicated on the individual student feedback form concerning whether or not instruction has been completed on an objective.29

8. **Performance Objective**: A statement of condition under which the student will perform, and the criteria he must achieve in order to be successful.30

---


26 Ibid., p. 178.


29 Ibid., p. 3.

9. Psychomotor: A skill pertaining to muscular action which follows directly from mental process.\textsuperscript{31}

10. Sliding Unit Evaluation Component: A method of using Comprehensive Achievement Monitoring so that the content span of each test contains one or more objectives from the content span of the test used in the immediately preceding or immediately following test administration.\textsuperscript{32}

SUMMARY

The possibility of forming Comprehensive Achievement Monitoring (CAM) tests on psychomotor skills has not been previously explored in terms of its feedback potential for students and teachers. An exploration of the benefits that might accrue began in the fall of 1972 with this research. CAM tests were given to two classes of ninth grade girls at Ravenswood High School in East Palo Alto, California. The difference in treatment in the two groups focused on the use of the feedback. One group received the teacher-directed use and the other group was concerned with student-directed use of the feedback. The study sample included the monitoring of forty-six students, who were randomly divided into an experimental and a control group with a pretest-posttest design.

\textsuperscript{31} Good, op. cit., p. 459.

\textsuperscript{32} Sequoia Union High School District, op. cit., p. 4.
Chapter II

REVIEW OF THE LITERATURE

I. INTRODUCTION

The literature pertinent to this study was reviewed in three specific areas: (a) that which related to the use of feedback in general education; (b) that which dealt with the use of feedback in physical education and gymnastics; and, (c) that which was related to the use of feedback as a result of Comprehensive Achievement Monitoring.

II. USE OF FEEDBACK IN GENERAL EDUCATION

Feedback is a process whereby the individual gains information concerning the correctness of his previous response so that behavior adjustment can occur to compensate for errors. Feedback is more inclusive than the knowledge of results.33

Feedback may be verbal or non-verbal in form. The non-verbal written feedback will be discussed in this chapter. However, it is recognized that both verbal and non-verbal feedback are important in the learning process.

---

33 Good, op. cit., p. 237.
Teacher Effectiveness as Related to Feedback

Effect of classroom atmosphere on feedback. The classroom atmosphere is an important consideration in giving and receiving feedback. Both the student and the teacher should experience a warm, interested and non-threatening educational climate. To add substance to this notion, Glasser and Cooley have indicated that feedback from students is contingent upon the teacher action or the educational result following the response.34

Flander's Interaction Analysis System is a widely accepted set of dimensions for describing the way a teacher interacts with his class. These dimensions emphasize the affective elements of the classroom atmosphere, which could have a definite bearing on student willingness to give feedback information to the teacher. When used as a training device to give feedback to teachers, the system has a specific set of objectives. Teachers are encouraged to foster self-starting and self-directed inquiry patterns of learning behavior in their students. The system helped adopt more indirect methods of reacting to students and more positive reinforcement for student feedback.35


Indirect influence utilized the ideas of students, applying or enlarging on those opinions, praising or encouraging the participation of students, and clarifying or accepting their feelings. Direct influence was designed to include the opinion and idea of the teacher. In addition, the teacher directed the student action and judged his behavior. Lastly, the teacher reinforced his authority or use of that authority throughout the teaching procedure used in the lesson. Flanders stressed that flexibility of teacher influence is important in producing student feedback, and the development of hypotheses concerning conditions under which direct influence might be preferable to indirect influence should be further explored.\textsuperscript{36}

Studies have investigated the notion that by using the Flander's Interaction Analysis System, the teacher will display more use of the technique of indirect influence than will the teacher who has not used the system. Finske (1967) found that student-teachers who were given training and feedback using the Flander's Interaction Analysis System were more flexible throughout their entire student-teaching experience. The student-teachers tended to use more extended, indirect methods in class discussions as well as more lecturing in classroom lessons. The lecture method exerted a direct influence and produced more student-

\textsuperscript{36}Ibid., p. 1426.
Field studies have found conflicting evidence regarding indirect influence and the promotion of greater pupil achievement. Although this teaching approach is associated with pupil creativity and lower individual anxiety, it does not appear to produce a more positive student attitude. It would seem that the class atmosphere associated with teacher indirectness promotes a freedom, between both the student and teacher, to exchange ideas concerning the learning-teaching process. In this situation, feedback could be used to full advantage by both the student and the teacher.

After feedback has been given to the student or to the teacher, one of several options is available to the individual. He may ignore the information, or he may choose to accept it. As a third choice, he may not accept the feedback. Lastly, he could accept the feedback, and plan to make a behavior change due to the additional information. In the case of the teacher, he may use the information for self-evaluation, student insight or curriculum change. The student may use the feedback for self-evaluation or as an additional insight in assisting members of his peer group.


38 Michael J. Dunkin and Bruce J. Biddle, The Study of Teaching (San Francisco: Holt, Rinehart and
Hopefully, the end result of such feedback usage is a continuous communication pattern between the student and his peers, his teacher, the school administrator and his parents.

**Feedback and improvement in teacher performance.** Prior to 1950, research studies exploring teacher effectiveness neglected to examine the actual processes of teaching. Critical events, the point at which the teacher, student, task and equipment merged and should have been investigated, were not included in most studies. However, present research has tended to focus on the teaching process.\(^{39}\)

The following cluster of research studies tests the hypothesis that feedback to teachers about their style of performance in the classroom, and about the effects of this style on the student will tend to increase teacher mastery of instructional skills. Steinen (1967) found that any one of three methods of providing feedback to student-teachers of mathematics increased their skill as teachers when compared to a control group. Feedback from other student-teachers, from a partner, and from students were all found to be more successful than self-appraisal feedback by the

student-teachers themselves, as they modified and retaught lessons.\textsuperscript{40}

Ishler (1967) tested the results of feedback versus no feedback in two comparable groups of student-teachers. Results indicated that teachers who received the feedback became increasingly more student-centered than did the teachers who received no feedback.\textsuperscript{41} The study conducted by Fuller, Veldman and Richek (1966) indicated that solitary self-confrontation with feedback information is ineffectual. This investigation confirmed the notion that feedback is more useful when a second person participates in the process.\textsuperscript{42} Steinbach and Butts (1968) studied the relationship of student-teaching using the peer group or the child, and the presence or absence of feedback concerning the teaching process in relationship to improved teacher competencies. Differences emerged between the students who taught children and those who taught their peer group. In


addition, student teachers who received the feedback were better able to gear their lesson to student interest and need, and to organize coherent class presentations.  

McGraw (1966) found that feedback based on 35mm time lapse photography, as used in micro-teaching, could be effective in changing the behavior of the control group which did not receive such feedback. Joyce (1967) suggested that feedback could be effective in producing change. Joyce indicated that supervisors need extensive training if they are to give constructive feedback information. 

In a study conducted by James (1970), it was found that a combination of supervision with self-confrontation, and the use of video-tape feedback was superior to the traditional supervision method alone in producing the use of more indirect teacher influence. Ratings of teachers


46 H. H. James, "Differential Efficiency of Three Supervisory Methods for Development of a Teaching Strat-
by their students have been defended and used as a basis for teacher self-improvement. The validity of this procedure lies in the assumption that the teacher's awareness of student evaluation of his behavior will affect teacher performance in the classroom. To test this notion, experimental groups of teachers were given reports on ratings of their behavior by their students. Behavior rating information was withheld from the control groups. Results seemed to encourage teacher knowledge and use of student ratings. 47

Research has supported the notion that teachers who are more accurate in predicting student responses should be more effective in relationships with the student. 48 In the study conducted by Runkel and Gage (1960), it was found that teachers receiving feedback from students changed their behavior in the direction of student description of the best imaginable teacher to a greater degree than did teachers not receiving the feedback. 49


49 Ibid., pp. 180-184.
Heinrich and McKeegan (1969) compared the effects of immediate and delayed feedback in modifying student-teaching behavior. The results verified that both groups have reduced discrepancy concerning teacher belief about how they were behaving, and how they were observed to act.  

Feedback from the principal or the department chairman seemed to affect the teacher's environment and performance. Information from ratings given by administrators and students may offer a practical approach to the in-service education of teachers.

Thus, the evidence seems to be consistent in advocating the advantages of giving teachers objective feedback about specific aspects of their teaching behavior. There is an indication that teacher use of feedback to make changes in teaching style occurs only if another person has taken part in the process. Simply examining one's own performance does not, it seems, provide motivation to alter the behavior pattern.


51 Gage, op. cit., p. 23.

52 Peck and Tucker, loc. cit.
After examining teacher effectiveness as related to feedback, the following section of the chapter will discuss the use of feedback in curriculum design.

**Curriculum Design As Related to Feedback**

The information reviewed in this section is concerned with the use of performance objectives, mastery learning and feedback, and the use of educational media in feedback.

**Use of performance objectives.** Educators are concerned with evaluation on a continual basis. Evaluation is conducted to assess student performance, teacher effectiveness, and subject contribution to the total educational effort. It has been strongly recommended that the evaluation of student performance be based on a system of performance objectives.\(^5^3\)

In support of the use of performance objectives in an evaluation program, Glen R. Hastings indicated that "if you give each learner a copy of your performance objectives, you may have little else to do." In this study, performance objectives were given to the experimental group without formal class instruction. The experimental group was given the mastery examination when ready, while the control group, taught in an instructor-orientated setting, was given tests.

---

at regular intervals. The results indicated that the experimental group scored significantly higher on the four unit examinations and the final examination.\textsuperscript{54}

Reti indicated that it is important for the teacher to know how to write performance objectives, and how to use the performance task or objective in the classroom setting. Performance objectives can serve as valuable aids to effective learning, teaching and measurement.\textsuperscript{55}

Available to the teacher, as a result of formulating performance objectives, is the criterion-referenced test designed to produce learning feedback based on predetermined standards. Moxley has indicated that, as a source of information, measures of relative rankings are weak, while measures based on specific performance criteria appear to be more valid. Thus, to maximize information feedback, criterion-referenced measures should be used. The teacher should seek on-target informational feedback, from non-threatening sources, and leading to the accomplishment of a valued goal.\textsuperscript{56}

\textbf{Mastery learning and feedback.} Mastery learning, an


educational concept which dates back in history to the last 1800's, incorporates the requirement and expectation that all students should meet a predetermined criterion or mastery level before progressing on to the next unit, skill or understanding.  

Bloom has stressed the function of the mastery test to be that of a diagnostic tool to indicate the weakness of the student and the instructor to both the student and the teacher.  

Ammons has formulated eleven generalizations dealing with feedback, and has indicated that the more specific the knowledge of performance, the more rapid the achievement improvement and the higher the level of performance. However, he later qualified this statement indicating that there is an optimum specificity level and additional knowledge beyond this will not improve performance.

Other educational sources have found that a knowledge of results is of little value to the learner following a correct response. This notion places some doubt on

---


the thought that the confirmation of correct responses has a rewarding property and acts as a reinforcer in learning. Feedback may aid the educational process when the learner has responded correctly, but is not certain of the correctness. A knowledge of results does facilitate learning when it follows wrong responses. Such feedback permits the learner to correct his mistakes and lessens the chance that he will recall the wrong responses as being correct.

The study conducted by Wentling sought to investigate the outcomes of mastery instruction as compared to a nonmastery approach of instruction with varying amounts of feedback given to students regarding their responses to multiple-choice test items on mastery examinations.

An apparent conclusion regarding learning strategy effect indicated that both immediate achievement and delayed achievement were superior for the mastery learning strategy as compared to the non-mastery strategy group. However, the amount of time spent on instruction was fifty percent greater for the mastery strategy with no significant difference in student attitude toward the process. A practical consideration would involve a decision in regard to the trading of time for student achievement and


61 Wentling, op. cit., p. 52.
attitude. In summary, the results of the study imply that the partial feedback treatment was superior and should be utilized to a greater extent in the educational process.62

Use of educational media in feedback. Several studies have focused on the impact of educational media on curriculum change and classroom interaction. For the most part, these studies are concerned with new devices for communication with the student regarding his learning. Television, the teaching machine, the video-tape, and the computer have been studied for their effects on the learning process. Unfortunately, most of the research has ignored the actual use of educational media in the classroom setting.63

Micro-teaching, a combination of a conceptual system for identifying specified teaching skills and the use of video-tape feedback, was studied by Allen and Fortune in 1967. Results of this effort indicated that the feedback system improved teaching effectiveness as measured by the Stanford Teacher Competence Appraisal Guide.64

Davis and Smoot (1969) found that eight-five students experiencing micro-teaching, as compared to a control group of fifty-five subjects, indicated signif-

62Ibid., p. 57.
63Dunkin and Biddle, op. cit., p. 25
Limbacher (1969) found that pupils of student-teachers who had earlier participated in a micro-teaching experience rated their student-teachers significantly higher than did students of student-teachers who had not had the experience. 66

Dunkin and Biddle suggest the combined use of programmed instruction together with computer-assisted instruction. When combining these two methods, instruction can be tailored to the needs of individual students, as revealed by the feedback, thus allowing educators to reduce the mass classroom experience. 67 The computer has a significant role in producing feedback on the nature and structure of specific educational objectives. Sass (1971) demonstrated how directed-graph procedures were efficient methods of storing hierarchical structures in computer memory. Learning variables were graphed on the basis of collected data. Additionally, the computer assisted in


67 Dunkin and Biddle, op. cit., p. 21.
the inventory of the instructional resources available for each objective in the curriculum. 68

Another use of the computer concerns collection of student achievement information. This data can be displayed in addition to the instructional resources in the printed feedback form. Cooley and Glasser (1969) found this procedure to be useful to curriculum specialists in evaluating the various instructional resources and procedures used in a school. 69

Lastly, the computer is suited to specific requirements of testing in an individualized program. After establishing the hierarchical structure of the curriculum, and the student need, branching is an important time-saving device, as Ferguson (1971) has indicated in his study. 70

In most cases, computer administered tests reduce the amount of student time required for testing. Often the clerical time required for scoring is greatly lessened.


69 Glasser and Cooley, op. cit., p. 852.

by use of the computer. Feedback, concerning the knowledge of test results, is more quickly and readily available to the student as a result of using the computer to organize and reproduce the information. 71

A study by Guthrie (1971) has direct bearing on the notion that immediate feedback is one of the key features assumed to be needed to promote learning. Guthrie studied learning achievement and time spent in reading prose passages by college students. These variables were assessed as a function of immediate, delayed or no feedback conditions. The main findings concluded that delayed feedback produced more learning than immediate feedback on the original learning material. However, immediate feedback produced more perseverance on a continuation passage than delayed feedback. The results were discussed in terms of positive and negative effect responses due to the type of feedback. Immediate feedback was presumed to evoke positive effect toward some aspect of the test. The reverse was postulated for the delayed feedback condition. 72

A study conducted by Sassenrath and Young (1969) indicated that delayed feedback resulted in superior delayed recall. More (1969) found that feedback provided two and one-half hours or one day after the responding, resulted in better delayed recall than feedback provided immediately or after a four-day delay.

III. USE OF FEEDBACK IN PHYSICAL EDUCATION AND GYMNASTICS

Physical education, and in particular the activity of gymnastics, has many shared objectives with the other disciplines of the school curriculum. These common objectives reflect the educational concepts associated with the development of knowledge and skill in the psychomotor, cognitive and affective learning areas. However, in dealing with the area of physical education and gymnastics, one is concerned primarily with the purpose of teaching large motor skills rather than verbally-orientated understandings. In educating the youth through the improvement of motor skill, measurement and feedback communication play


a vital role in evaluating teacher and curriculum effectiveness. 75

Teacher Effectiveness As Related To Feedback

Heitmann (1966) has given evidence that physical education teachers have difficulty in consistently evaluating the effectiveness of their lessons. Heitmann suggests that perhaps physical educators place little significance in the importance of examining the teaching method. 76 A study conducted by Roundy (1967) concludes that physical education teachers seem to be far more concerned with the problems of discipline, supervision, equipment and grading than with the evaluation of teaching methods. 77

Wilson has used three feedback methods in the evaluation of performance objectives in gymnastics. Using the sub-skill of free exercise or tumbling, the feedback methods of judge evaluation, video-tape evaluation and


and instructor rating were intercorrelated. The results indicated that each medium was highly competent in the technique of evaluation when using performance objective criteria. 78

In establishing a guide for teaching of gymnastic skills, Garis studied teacher behavior. Garis suggests that "teachers should seek feedback from the student regarding what helps or does not help them to learn gymnastic skills." The teachers' guide makes use of feedback to aid the teacher in instruction and evaluation of the student and in program and teaching process evaluation. In conclusion, Garis indicates that individualization of instruction and curriculum revision can result from diagnosis of teacher effectiveness as reported by student feedback. 79

Student Achievement as Related to Feedback to Students

Research studies, important to the discussion of student achievement as related to feedback to students, include the investigation conducted by Robb (1970). She concludes that feedback information and skill practice were important components in psychomotor learning. Concurrent


visual feedback, providing for moment-to-moment regulation of behavior, appears to be the most important feedback method for learning a psychomotor skill, concludes Robb.  

Malina (1968) reports positive effects of varied informational feedback on practice conditions involving the overarm throw in physical education. Paramount in the study was the influence which feedback mechanisms may have on the individual in the development of proficiency in a large motor task, such as the overarm throw in baseball.

The quantity and quality of feedback given to the student was studied by Smoll (1971) who found that there was a point at which quantity would not enhance the learning of a motor skill. In comparing quantity and quality feedback, Smoll concludes that "practice involving more precise quantitative feedback results in a significantly higher level of student performance than practice involving less precise qualitative feedback."

Curriculum Design as Related to Feedback

Use of performance objectives. Literature reveals that the teacher should consider feedback from the educational

\[80\] Margaret Robb, "Feedback and Skill Learning," Research Quarterly 42 (December, 1971), 175-184.


\[82\] Frank L. Smoll, "Effects of Precision of Informa-
environment to be of great importance to the formulation of performance objectives. Ellsberg, in his essay on the need for a relevant high school curriculum, stresses that physical educators should consider all sources, and content of feedback in determining those skills all students should develop. In addition, these skills should be stated in performance terms and indicate the determination of acceptable proficiency standards.83

Wessel indicates that skill objectives in physical education are performance objectives written in behavioral terms which teachers should view as objectives to be achieved by the majority of students. She stresses that performance objectives should be stated at two levels of specificity: the terminal and the enabling levels. The terminal performance objective represents the skill to be acquired while the enabling objective describes the sequence of behavior which guides the learner from little or no skill toward the desired performance ability.84

In gymnastics, Baldwin indicates a need for proficiency tests based on performance objectives. She suggests


that evaluative instruments in gymnastics appear to be almost non-existent. In developing an instrument, Baldwin sent questionnaires to gymnastics coaches to obtain data for the study. Skills selected for evaluation in the instrument resulted from questionnaire feedback. Each skill was assigned a point value according to its degree of difficulty. Scoring for each skill was calculated by dividing the total points scored by the total points possible. The highest score for each skill was used in the calculation. As a result of this study, Baldwin suggests that this proficiency test would enable the teacher to effectively evaluate the student at the end of the unit.85

The Ohio Curriculum Guide Committee used performance objectives based on feedback information for the basis of curriculum selection. The group defined the psychomotor, cognitive and affective learning areas in physical education and constructed a curriculum on this basis. The classification of objectives became the guideline for constructing the curriculum as well as for the selection of teaching methods and evaluation tools.86


Feedback seems to be the central consideration in the writing of performance objectives and the selection of activities by which to achieve these objectives. Evaluation, a necessary component of learning, must be structured to yield significant feedback information. Clarke concludes that "no testing project should be undertaken unless it is part of an attack upon a clearly defined educational problem, the solution of which can be aided materially by the use of tests and feedback."  

Use of educational media in feedback. In reviewing the literature regarding feedback and curriculum change in physical education and gymnastics, focus is placed on the advantages offered by the use of educational machines. Advent of video-tape or land photographic techniques and the computer have increased interest in producing educational feedback.

The computer has been a useful tool in compiling, storing and releasing feedback information. Linquist (1969) used the computer in her study exploring the "Information Processing Approach to Learning a Tennis Serve." Data from the psychomotor skill area were collected, coded and analyzed by the computer. The feedback

---

obtained from the computer and other forms of data (videotape) allows Linquist to make a contribution to the methods used in learning a complex motor skill and to the development of computer-assisted instruction in physical education. 88

Sydow examined the activities in a physical education program and established four natural groupings:

(a) the team or the individual sport; (b) the activity based on continuous flow of action; (c) the situation where the length of activity is determined by time measurement; and (d) the activity where scoring is based on goal points or by judging. Five applications for the computer in physical education were then identified. The computerization of the processes of simulation, scheduling, scoring, statistical computation and scouting could reduce teacher time and allow for more student-teacher interaction, Sydow concludes in his study. 89

Other uses of the computer include the notion of "banking" objectives, resource units and evaluative data. Hill has used the computer to "bank" information concerning the area of health, weight control and nutrition. 90


90 Charles E. Hill, "Computer-Based Resource Units
Teachers at Simmons Junior High School in Aurora, Illinois, have developed a physical education curriculum evaluated by the computer. This is an individually-paced program with student progress monitored by the computer. Psychomotor and cognitive performance objectives provide immediate learning direction to the student. After a level of competency has been reached, a student is asked to demonstrate his ability. No letter grades are given. Instead, the student confers with the teacher, discussing his feedback printout as generated by the computer. Feedback seems to be a central factor in increasing student motivation and achievement at Simmons Junior High School, indicates Andrew J. Hook.91

However important the generation of feedback to effective learning, the key to competent evaluation appears to be the change or modification which one makes in teaching performance or curriculum design as a result of examining the feedback.

IV. USE OF FEEDBACK AS A RESULT OF COMPREHENSIVE ACHIEVEMENT MONITORING

Comprehensive Random Achievement Monitoring (CRAM), later changed to Comprehensive Achievement Monitoring (CAM),


is a method to individualize instruction, to monitor achievement, and to give feedback regarding student progress.

Original funding for the CAM Project came from the Charles F. Kettering Foundation to Stanford University in 1966-1968, and was continued during 1968-1970 at the University of Massachusetts. During the four developmental years, the administrative responsibilities moved to the University of Massachusetts while the data development and processing remained at Stanford University.92

Comprehensive Achievement Monitoring may be adapted to test achievement on every objective, or a fraction of the course objectives, at frequent test administration periods throughout the instruction. Dwight W. Allen, instrumental in obtaining the original funding, has indicated that the CAM evaluation method yields information of a superior quality due to the systematic pretest and measures of retention of objectives, as well as the generation of immediate-after-learning feedback.93

Advantages and Disadvantages of CAM

William P. Gorth, CAM Project Director at the University of Massachusetts, believes that teachers often

---

92 John Easter, "The California CAM Consortium...A Proposal" (Redwood City: Educational Services Division, Sequoia Union High School District, 1975), pp. 1-2. (Mimeographed.)

93 Allen, Dwight W. and others. "An Introduction to Longitudinal Testing Using Item Sampling Techniques:" TM-25. (Amhurst: University of Massachusetts, School of
find the relationship between curriculum and evaluation hampered by the difficulty in interpreting test results, or by tests that are poorly correlated with course objectives. A synergistic relationship, a working together of teacher and test, can produce greater student learning than either teacher or test can produce alone. Evaluation focused on teacher concerns about students, achievement and curriculum, emphasizing the interrelationship of the three areas, can be extremely useful to the teacher. CAM seems to accomplish the goal of synergistic relationship by leading teachers to decisions which identify student need, define curriculum and set priorities for information collection. Repeated estimates of student achievement prior to instruction, immediately-after-instruction, and, after a significant time-lapse to measure retention knowledge, yield necessary information for teacher decisions. 94

Through interviews and questionnaires sent to teachers experimenting with the use of CAM from 1967-1970, the feedback indicated the following advantages of the system: 95

---


95 Ibid., p. 3.
1. The information from the computer analysis of the longitudinal data assisted in the evaluation of teacher effectiveness.

2. The evaluation scheme allowed each teacher to monitor the retention of the performance objectives, and to modify the course to refresh student comprehension in areas easily forgotten.

3. The feedback information promoted continuous and systematic evaluation of the course curriculum.

4. The monitoring structure eased the pressure of the typical testing situation by allowing the student many opportunities to demonstrate his performance.

5. The regularity of the test monitors seemed to be positively accepted by the student.

6. The variety of computer analyses available gave useful feedback to the student, the teacher and the curriculum specialist.

The disadvantages of the CAM system of evaluation were listed as:

1. The preparation of performance objectives and corresponding test items was time consuming to the teacher.

2. The numerous clerical tasks involved in the administration of the CAM monitors were time consuming to the teacher.

---

96 Ibid., p. 5.
3. The instruction, at times, was reduced to "teaching to the test."

4. In some instances, when using the CAM system, there was a restriction of teacher flexibility in the classroom.

5. In an attempt to produce a variety of data on the achievement of each student, too many tests were included in the program.

6. Miscalculation of time allotted in the program resulted in ineffective use of the feedback information.

7. The variation in degree of financial commitment by the school district affected the program.

In 1971, Schriber and Gorth released information which discussed other advantages of CAM. The evaluation system included the storage of test items and the selection and printing of the test form by the computer. Thus, it was possible within the CAM structure to select and retrieve objectives from which a curriculum could be individualized to personal choice.97

Schriber, in a paper presented at the annual meeting of the National Council of Measurement in Education in 1971,

indicated that a primary advantage in using the monitoring tool was that of allowing the systematic gathering of comprehensive performance data to be used as means of establishing an economic analysis for various instructional and curricular alternatives. With the growing concern for greater accountability to external, as well as internal, evaluation agencies, educators might dwell on this suggested use of CAM.

Courses Monitored by CRAM or CAM

At the beginning of the 1966-1967 academic year, several schools embarked on a program utilizing the CRAM tool: (a) a general science course at Andrew Jackson High School in Portland, Oregon; (b) an electrician's mate, class "A" course at the Great Lakes Training Center in Great Lakes, Illinois; and, (c) English, history, biology and mathematics courses at Duluth Central High School in Duluth, Minnesota. James Duffy, Principal of Duluth Central High School, indicated that local educators were seeking an evaluation program to meet the needs of the low-achieving students.


Other programs monitored by CRAM in 1967-1968 included: (a) trigonometry and advanced algebra at Kailua High School in Oahu, Hawaii; (b) introductory mathematics at Andrew Jackson High School in Portland, Oregon; and, (c) biology at Nova High School in Fort Lauderdale, Florida. In all these courses, cognitive performance objectives were written and measured. 100

In 1968-1969, the following schools joined in the experimental effort: (a) Hopkins High School in Hopkins, Minnesota; (b) Lincoln-Sudbury Schools in Lincoln, Massachusetts; and, (c) Levittown Public Schools in Levitt, New York. 101 The use of CAM had penetrated the elementary as well as the secondary classroom.

Paul Pinsky, in 1970, expressed concern about the design and analysis of the feedback information concerning achievement test results. He stressed the need for three basic types of information: (a) feedback for the individual student; (b) feedback for a homogeneous group of students; and, (c) feedback for curriculum evaluation. In addition to the feedback which could be produced by statistical analysis, Pinsky gave support to the validity of teacher comment as a source of feedback. He concluded that both areas of feedback should be considered when

100 Ibid., pp. 11-15.
101 Ibid., p. 16.
making decisions concerning instructional activities.\textsuperscript{102}

The Sequoia Union High School District in southern San Mateo County, California, became interested in the concept of Comprehensive Achievement Monitoring and financed a CAM model program in 1970. Although CAM offered existing evaluation potential, the school district modified and further developed the structure of CAM.\textsuperscript{103}

From 1971-1974, the California State Department of Education supported approximately two-thirds of the CAM development within the Sequoia Union High School District with a Title III grant. In 1975, the Sequoia District received an ESEA Title II dissemination grant to develop CAM in other districts. As a result of this effort, CAM processing centers have been established in the counties of San Diego, Orange, Los Angeles and Santa Clara.\textsuperscript{104}

To determine the effectiveness of the CAM tool, the Sequoia District tested the hypothesis that as a result of classroom modification based upon CAM feedback from the previous year, students in the CAM program would show a posttest performance level for Semester 1, 1973-1974, which was at least five percent greater than the posttest

\textsuperscript{102}Paul Pinsky, "Feedback Information in the Comprehensive Monitoring of Educational Achievement" (paper presented at the annual meeting of the Institute of Management Sciences, Los Angeles, California, October, 1970).

\textsuperscript{103}Easter, op. cit., pp. 2-3.

\textsuperscript{104}Ibid.
performance level of CAM students for the first semester of 1972-1973. In addition, teachers volunteered to participate in a CAM group or in a control group. The control group was taught in the traditional manner in order to test the effectiveness of student feedback in the Comprehensive Achievement Monitoring group. The courses in the evaluation study included: algebra, general math, biology, physics, chemistry, world geography, anthropology, medieval and Renaissance history, English, vocabulary, foods, French I, French II, marketing and business law.

The result of the entire study indicates that in all courses but one, the CAM evaluation tool resulted in producing at least five percent gain in learning when comparing the two posttest scores.105

In 1974-1975, the Sequoia Union High School District enlarged the CAM system to include arithmetic, general science, earth science, homemaking, language arts, literature comprehension and Spanish.106 With the absence of measurement in the psychomotor domain using the CAM tool,

---


this research study brings information regarding the measurement of psychomotor skills in a gymnastics class in physical education.

A consortium of school districts using CAM has been proposed by John Easter, Assistant for Research in the Sequoia Union High School District, to help solidify gains, and provide a center for future development and refinement of CAM. State financing is currently being sought for this further development of CAM.\footnote{Easter, op. cit., p. 4}

The State of New York has supported the use of CAM in evaluating the educational program for the past ten years. CAM projects were installed in the schools at Ballston Spa; Jamesville-DeWitt; and Greece (New York). In counties Putnam-Westchester and Nassau, the state supported vocational and special education schools, the Bureau of Cooperative Educational Services (BOCES) have utilized the CAM procedures to evaluate learning. These programs include a wide setting of geography, students, educational process and data processing configurations. Two of the projects involve special technological applications which heretofore did not exist. The first innovation was the use of small, inexpensive on-site computers at Greece Central and Jamesville-DeWitt Schools. The Putnam-Westchester BOCES represents a regional CAM development which has
been developed with the eventual expectation that this installation will possess the capability of offering achievement monitoring in several subjects at all grade levels for all schools in the region. The Nassau BOCES project represents another effort at developing a model which will illustrate how a regional center may provide services for computer-managed instruction. In conclusion, the Bureau of School and Cultural Research in New York State viewed CAM as an improved technique, which seemed to aid educators in making instruction and program-related decisions at all levels. In addition, by utilizing the CAM system, administrators could make better decisions concerning resource allocation, curriculum, and educational accountability. Lastly, and probably the most significant advantage of CAM, is the opportunity for teacher and student feedback regarding educational achievement.108

V. SUMMARY

In summarizing this review of related literature and research, the investigator concluded:

1. There is an abundance of current information regarding teacher effectiveness as related to feedback.

108 "Comprehensive Achievement Monitoring...A Technique for Instructional Management" (New York: The State Education Department, The Division of Research, The Bureau of School and Cultural Research, 1971), pp. 1-2. (Mimeographed.)
Studies support the notion that feedback is important in improvement of teacher performance. To be effective, feedback should be given by a second person and the teacher must be receptive to the feedback process.

2. When reviewing general education curriculum design as related to feedback, performance objectives appear to be essential in curriculum construction. As a result of the formulation of performance objectives, the criterion-referenced test structure is available as an evaluation method. Studies report that when using educational media to produce feedback, programmed instruction integrated with computer-assisted instruction offers many educational strengths.

3. When examining teacher effectiveness in physical education and gymnastics as related to feedback, it appears that little research has been undertaken in this area. Several current studies have yielded some information concerning student achievement as related to feedback to the student.

4. When discussing curriculum design in physical education and gymnastics as related to feedback, investigators stress that performance objectives, based upon feedback appear to be a necessary component of curriculum construction. The use of educational media to produce feedback in physical education and gymnastics is currently being studied.
5. There is an abundance of information concerning the use of the Comprehensive Achievement Monitoring evaluation technique in the cognitive domain, but an absence of studies adapting the model to the psychomotor area of learning.

The literature and research which is pertinent to this investigation has been reviewed in Chapter II. This review was undertaken in three specific areas: (a) use of feedback in education; (b) use of feedback in physical education and gymnastics; and, (c) the use of feedback as a result of using Comprehensive Achievement Monitoring.

The research design and the procedure which was used in the present study is presented in Chapter III.
Chapter III

PROCEDURE

I. POPULATION AND SUBJECTS

Ravenswood High School is located in the center of the predominantly black community of East Palo Alto, California. It is one of the six high schools in the Sequoia Union High School District in San Mateo County. Forty-five percent of the student population is of the Negro race, and chose to attend Ravenswood as their neighborhood school. The remaining fifty-five percent of the student body is of the Caucasian race and had volunteered to attend Ravenswood instead of their neighborhood school. These students were "bused" to Ravenswood from the communities of Belmont, San Carlos, Redwood City, Woodside, Portola Valley and Menlo Park.

When discussing the demographic conditions of East Palo Alto, the San Mateo County Planning Department indicated, through a census taken in April, 1970, that a total of 18,412 residents lived in the community. A breakdown by ethnic background revealed a Caucasian population of 6,552, a Negro population of 10,868, and a
remaining population of 988 people.\textsuperscript{109} (Refer to Table 1.)

The Sequoia Union High School District is comprised of the entire area of southern San Mateo County and includes the communities of Atherton, Belmont, East Palo Alto, Menlo Park, Portola Valley, Redwood City, San Carlos and Woodside. When reviewing Table 1, the writer found that the East Palo Alto residents exhibit different characteristics in the areas of race, property ownership and income from the other community members living within the high school district.

During the 1972-1973 school year, approximately eight hundred students voluntarily elected to attend the integrated high school. The forty-six subjects in this study encompassed the ninth grade female population attending Ravenswood in the fall of 1972.

The girls in the ninth grade class were scheduled randomly, according to registration order, into one of two classes designed for freshmen physical education. The experimental group, determined by a toss of a coin, was the morning class, scheduled from nine o'clock to ten o'clock. The control class began school with a class size of thirty, while the experimental group numbered twenty-eight students. Six girls dropped both the control and

\textsuperscript{109} San Mateo County Planning Department, "Comparative Data...Population by Race -- 1970" (Redwood City: County Government Center, 1970), p. 1. (Mimeographed.)
### Table 1
Demographic Comparison Between East Palo Alto and San Mateo County

<table>
<thead>
<tr>
<th></th>
<th>East Palo Alto</th>
<th>San Mateo County</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RACE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Caucasian</td>
<td>36</td>
<td>88</td>
</tr>
<tr>
<td>% Negro</td>
<td>59</td>
<td>4</td>
</tr>
<tr>
<td>% Other</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td><strong>LIVING QUARTERS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Owners</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Owning Home</td>
<td>47.9</td>
<td>67.1</td>
</tr>
<tr>
<td>Median Value of Home</td>
<td>$20,375</td>
<td>$30,400</td>
</tr>
<tr>
<td>Renters</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Renting Home</td>
<td>52.1</td>
<td>32.9</td>
</tr>
<tr>
<td>Median Value of Monthly Rent</td>
<td>$137</td>
<td>$154</td>
</tr>
<tr>
<td><strong>INCOME</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income</td>
<td>$9,401</td>
<td>$13,222</td>
</tr>
<tr>
<td>Median Per Capita Income</td>
<td>$3,116</td>
<td>$4,581</td>
</tr>
</tbody>
</table>

††San Mateo County Planning Department, "Comparative Data...Housing Units by Type of Occupancy and Median Family and Per Capita Income--1970" (Redwood City: County Government Center, 1970), pp. 2-3. (Mimeographed.)
the experimental classes for a variety of reasons including transfer to another school and moving away from the area. Thus, data was collected on twenty-four students in the control group and twenty-two students in the experimental group.

II. DEVELOPMENT OF COMPREHENSIVE ACHIEVEMENT MONITORING

In January of 1970, the writer attended a Sequoia Union High School District workshop entitled, "Comprehensive Achievement Monitoring, A Tool for Evaluation." The workshop was organized and conducted by Mr. John Easter, Research Assistant for the school district, and by Dr. William Gorth, Assistant Professor and Project Director at the University of Massachusetts, Amhurst, Massachusetts. Following the workshop, and as a result of immediate interest in the tool, the author participated in discussion sessions with John Easter in an effort to explore the use of Comprehensive Achievement in the area of physical education. The spring and the fall semesters of 1970 were devoted to the adaptation of CAM to the measurement of psychomotor skills in a girls' gymnastics unit in physical education.
Basic Decisions Prior to Using CAM

Curriculum design. A curriculum design, including physical education activity selection, area of skill objectives to be measured, grade level of subjects chosen, and length of the course to be evaluated by the CAM tool, was finalized. The writer decided to use the activity of gymnastics, designed for ninth grade girls because of the structural adaptability of the psychomotor skills to the CAM model. The eleven-week unit began on Monday, October 2, 1972, and concluded on Thursday, December 14, 1972.

Performance objectives. Performance objectives were written using measurable terms. On the basis of professional discussions with colleagues, past teaching experiences and written resources, performance objectives were developed for the psychomotor area of learning. (See appendix A.)

III. MEASURING INSTRUMENT

Development of Instrument

Psychomotor objectives were written for four areas related to women's gymnastics: tumbling, balance beam, uneven parallel bars and the horse. The following

---

are examples of performance objectives included in the measuring instrument (see appendix A).

1. You will perform a forward roll in good form and finish in a standing position.

2. You will perform a front support on the low bar of the uneven parallel bars and hold the position for one second.

3. You will perform a squat turn on the balance beam.

4. You will do a straddle vault over the horse.

Test Items

The objective, or goal, became the test item in the psychomotor instrument.

Pilot Study

In the spring of 1972, a pilot study was conducted using the entire female population of the freshmen class attending Ravenswood. Sixty-nine girls in two classes were given a nine-week gymnastics unit utilizing the psychomotor testing instrument developed by the author. As a result of teacher inspection of the pilot information, objectives were specified and modified by the participating teachers, and the unit length was extended to eleven weeks.

Inter-Rater Reliability Check

In September of 1972, Miss Ann Mori, Bay Area physical educator and gymnastics specialist, participated in the inter-rater reliability check of the two participating teachers using the testing instrument in the research
study. Miss Mori, a Burlingame High School teacher, qualifies as a gymnastics expert in that she teaches all levels of women's gymnastics at Burlingame High School and at the Peninsula Sports Center in Burlingame, California. In addition, Miss Mori coaches the advanced performers at the high school and club. Miss Mori has been instrumental in organizing the Northern California Gymnastics Program for High School Girls since 1970 and has organized and conducted gymnastics workshops for teachers and students at the California State University campuses in Hayward, Humbolt and Stanislaus. Lastly, she held the office of Vice-President, Girls' and Women's Sports, 1972-1973, in the California Association for Health, Physical Education and Recreation.

Ten subjects were chosen from a gymnastics class composed of girls from the sophomore through the senior year in high school. The girls, interested in participating in the inter-rater reliability check, ranged from novice to intermediate in skill ability. They were, for the most part, familiar with the psychomotor skills they were asked to perform.

There were twenty-three objectives selected to be in the inter-rater reliability check: eight tumbling skills, four movements on the balance beam, eight uneven parallel bar skills and three vaulting moves. These skills represented novice through intermediate moves which were
included on the pretest and posttest to be used in the study.

Three rating sessions were needed before agreement between the participating teachers, Elizabeth Crosby and the writer, and the expert could be obtained. After the first rating session on September 10, 1972, it was obvious that the **Verbal Description** section of each objective needed to be clarified. The competency factor of gymnastic performance was also included in each of the psychomotor objectives. Competency was defined as the ability to complete the objective in good balance. After many work sessions, the objectives were rewritten to include the specific form, verbal description, and the competency expectation. The following is an example of the structure of a psychomotor objective:

**OBJECTIVE/TEST ITEM:** You will perform a forward roll in good form and finish in a standing position.

**VERBAL DESCRIPTION**

1. **Starting position** - Put your feet and knees together in a deep squat position. Place your hands on the mat with your arms outside of your knees.
2. **Action** - Tuck your head to look at your stomach and raise your hips over your head. Bend your arms, lowering your upper back to the mat. Push with your hands. Extend your knees, roll over to a standing position.
3. **Finish** - End with your feet and legs together, your weight on the balls of your feet, your arms extended in front of your body and straighten to a stand.
COMPETENCY EXPECTATION

You will complete the forward roll in good balance.

TEST DIRECTION

Do a forward roll in good form and finish in a standing position.

A total of three rating sessions were conducted in September of 1972, with the last check concluding on September 28, 1972, four days prior to the beginning of the study. The inter-rater reliability between the expert and each of the two participating teachers was .99 using the Pearson Correlation Coefficient. One participating teacher and the expert did not agree on the form, the verbal description section of the tumbling skill, the cartwheel. (See appendix G.) The other participating teacher and the expert did not agree on the competency section of the balance beam skill, the squat turn. (See appendix G.) All other judgments on the twenty-two remaining items were in complete agreement with Miss Mori.

IV. EXPERIMENTAL PROCEDURE

Evaluation Design

It was decided to use the "Sliding CAM." In this procedure, an evaluation component was structured so that the content span of each test would contain one or more of the objectives from the content span of the test used in the immediately preceding and/or immediately following test administration. Thus, during any test administration,
except the pretest, data could be collected on two or more of the following information items: pretest, after instruction, posttest and retention.

All subjects received the Comprehensive Achievement Monitoring treatment and the feedback print-out called the Individual Student Report. (See appendix I.) The difference in treatment in the two groups focused upon the use of this feedback. In the experimental group, the teacher-directed method was used. The teacher diagnosed the feedback in terms of the accomplishment of the gymnastics psychomotor objectives prior to student exposure to the computer print-out. During the days allotted to skill reteaching as a result of feedback diagnosis by the teacher, the instructor conducted a structured reteaching of the unachieved objectives.

In the control group, a student-directed method of feedback utilization was employed. The student approached the teacher, who assumed the role of a resource person, for assistance in reviewing the unaccomplished skills.

**Instructional Calendar and Log**

It was decided to schedule seventeen testing days, six review sessions and seven feedback diagnosis and reteaching of objectives days. A daily schedule for teaching the objectives was also included on the Instructional Calendar. (See appendix D.)
**Item Matrix**

The course was given a title and a course number. Each of the participating teachers and students were assigned an identification number. In addition, the objectives were given a three-digit number and the test item a two-digit number. The resulting five-digit number became the test number. Finally, the item matrix, a form which contained the test item numbers for each objective, was constructed. (See appendix H.)

The length of the item matrix was determined by the number of objectives to be taught and by the length of the class period.

**Class Assignment**

The two participating teachers were assigned to a specific class by the local school administration. To reduce teacher affect upon the resulting data in each of the two groups, a schedule of teacher rotation was designed. (See appendix D.) After teaching the objectives, administering a test monitor, diagnosing the feedback and reteaching the skills for one group, the two teachers changed classes for the next teaching period. Three days were delegated to team-teaching by the participating teachers in both groups.

**Test Administration**

When testing the skills, the students were placed in groups of five or less. When conducting the pretest, a
student did not attempt to perform a skill if it was a new experience to her. The test direction was read to the student twice, and she was given one trial to perform the skill. While waiting to be tested, the student worked on reviewing the skills, using a partner or a spotter. Throughout the testing procedure, the teacher was aware of, and occasionally supervised, the girls who were reviewing the skills.

Teaching Strategies

The objectives were taught to students in terms of difficulty and prerequisite skills needed by students in order to learn the objectives. Girls were assigned to one of the five or six groups in order to practice the skills efficiently. Efforts were made for a heterogeneous grouping of students in each practice group. During an instructional day, the student was exposed to a review of the previous day's activities, the initial presentation and practice of several new objectives, as well as a warm-up series of exercises at the beginning of the fifty-five minute period.

When initially teaching a skill, the following procedure was used by both teachers: (a) demonstration of the skill by a competent student; (b) explanation of the verbal description and competency expectation of the objective by the teacher; (c) stimulation of student questions; (d) redemonstration of the skill and the
spotting technique (safety objective) by a competent student; and (e) student practice of the skill with a partner (spotter) and under direct teacher supervision.

**Teacher-Directed Feedback (Experimental Treatment)**

In the experimental group, after diagnosing the feedback in terms of those objectives a student did not achieve, the feedback print-out was given to the student. She was given interpretation assistance by the teacher. The teacher then focused instruction on those objectives which the student did not pass. Students who needed to learn the same skills were grouped together in units of less than six girls. When reteaching the objective, the initial teaching strategy was used. Specific emphasis was given to the learning difficulty of each student as revealed by an inspection of the verbal description section of each objective in the CAM tool.

**Student-Directed Feedback (Control Group)**

In the control group, after giving any interested student the feedback print-out, the teacher assisted each girl with feedback interpretation. Next, the instructor indicated that she would assist anyone with skill relearning. Thus, it was evident in the control group that the teacher took the role of a resource person for those motivated students who used the class periods for accomplishment of those objectives not passed in the previous
test administration.

During the first class session devoted to feedback, all the control group students, except one, received the print-out sheet. Ten girls sought the help of the teacher in skill relearning. All girls in the class received the feedback print-out for the second group of tests. Of that group, twelve students actively sought teacher assistance. At the last session, all class members received the print-out sheet, and eleven asked for teacher help in accomplishment of objectives. (See appendix I.)

Individual Projects

After completing feedback analysis and relearning of objectives, students in both treatment groups selected one of the following projects to enhance further understanding. The project options included: (a) creating a tumbling routine; (b) creating a routine on the balance beam; or (c) creating a routine on the uneven parallel bars. A minimum of four skills were included in each composition. The routine was presented to the entire class after the reteaching had been completed.

Gathering of Data

Prior to the actual rating session, the teacher organized the rating form to include the names of the girls in their designated groups as well as a list of the objectives to be tested. When rating each objective, the
teacher marked a rating form using a "Pass" or an "Unachieve" for the judgment concerning the form (verbal description), and a "Pass" or an "Unachieve" for the judgment concerning the competency expectation of each objective. To receive a total pass, a student had to pass both parts of the objective ultimately. (See appendix C.)

After the ratings were concluded, the teacher transferred all the marks to a marksense card for computer processing. A mark in the "1" column next to an objective number indicated a "pass," and a mark in the "2" column indicated an "unachieve" on the objective.

When gathering the data, two days were used for the pretest, five days for the second test administration (within unit test), five days for the third test administration (within unit test), five days for the posttest, and seven days allotted to review of the feedback and skill relearning. After each group completed the entire test, the girls worked on a new warm-up routine which consisted of at least twelve exercises. These routines were presented to the class.

Processing of Data

After each testing period was concluded and the marksense cards were marked, the information was taken to the Sequoia Union High School District Office for processing. The results were returned by district mail or hand-
delivered to the CAM teachers within a twenty-four hour period.

Data Forms

The Individual Student Report was used by the teacher for diagnosis and then given to the students in both the experimental and control groups. (See appendix I.) The Teacher Summary Report and the Group Summary Report gave the teacher information on clusters of objectives and groups of students. (See appendices J and K.)

V. ANALYSIS OF DATA

Hypothesis

The research hypothesis in the Comprehensive Achievement Monitoring measurement of the psychomotor domain is that ninth grade girls monitored by the CAM tool and the resultant modification of instruction in gymnastics due to teacher-directed feedback analysis will show greater gains between the pretest and posttest scores than will students monitored by the CAM tool and using the student-directed method of feedback analysis.

Statistical Treatment of Data

Analysis of covariance. Total posttest scores on the test formed the basis for this analysis. A two-by-two factorial covariance analysis with the pretest as covariate was used in this study. The two factors employed were socio-economic
level and treatment. Computations were performed using SPSS on an IBM computer at Stanford University. 111

Introduction of competency of the students prior to the experiment as a covariate removed the effect of this variable from the results obtained in the posttest. Another variable that might affect the posttest results, in addition to the two treatments, was the socio-economic level of the students. Since this variable is categorical, it is included as a factor in the experiment. This gives a two-by-two factorial design. There are two factors in the experiment, socio-economic level and treatment; and each of these factors has two levels. Students from the East Palo Alto attendance area were analyzed in the low socio-economic group, while the high socio-economic group was composed of the remainder of the freshmen girl population attending the high school. The design is illustrated in the following chart:

| EXPERIMENTAL GROUP | Low Socio-Economic | Pretest | Posttest |
|CONTROL GROUP       | High Socio-Economic | Pretest | Posttest |
|                     | Low Socio-Economic | Pretest | Posttest |
|                     | High Socio-Economic | Pretest | Posttest |

In the analysis, tests are made to determine whether the effects of the treatment are similar for both socio-economic levels, or whether the effect of the treatment is dependent on the student's socio-economic class. In subsequent tables, the interaction effect measures the dependency between the independent variable treatment and socio-economic level.

Chi-Square. An analysis of individual items on the test was completed using chi-square procedures. In the analysis for each item, only those subjects were included who had failed the item on the pretest. The ratio of subjects in the experimental group and in the control group who passed the item on the posttest, were obtained. The chi-square statistic was then used to test the null hypothesis that there was no difference between the experimental subjects and the control subjects in the proportion who performed successfully on the posttest after having failed the item previously. In this analysis, there was no breakdown by socio-economic groups.

A significance level of .01 was chosen for the item analysis rather than the .05 level as used in the covariance analysis since a number of differences would be expected to occur by chance alone when so many different items were analyzed. Thus, for the chi-square tests, the teacher-directed use of feedback treatment was considered significantly better than the control treatments for a
given task where the obtained results would occur less than one time in a hundred by chance if, in fact, both treatment groups were equally effective.

VI. SUMMARY

This study explored the teacher-directed use of feedback versus the student-directed use of feedback as generated by Comprehensive Achievement Monitoring. Selected psychomotor performance objectives were measured in ninth grade girls' gymnastics classes.

The data from the research study were analyzed using the analysis of covariance with the total posttest scores. A two-by-two factorial covariance analysis was used with the pretest as the covariate. The two factors employed were socio-economic level and treatment.

An analysis of individual items (objectives) on the test was completed using the chi-square statistic. In the analysis for each item, only those subjects who had failed the item on the pretest were included.
Chapter IV

ANALYSIS OF THE DATA

I. TREATMENT EFFECT ON TOTAL TEST SCORES

This chapter presents the statistical analyses of data of the study. The hypothesis to be tested involves a comparison of the effect of the special treatment employed in the study as compared to the method customarily employed in physical education classes. Since the effects of the treatment might be dependent on the proficiency in gymnastics of the students when they entered the classes and on their general background resulting from widely differing socio-economic conditions, a statistical method was chosen which would control and respond to the effects of these factors. The statistical analysis was a two-by-two analysis of covariance.

The research hypothesis in the Comprehensive Achievement Monitoring measurement of the psychomotor domain is that ninth grade girls monitored by the CAM tool and experiencing teacher-directed use of resultant feedback in gymnastics will show greater gains between the pretest and posttest scores than will students monitored by the CAM tool and experiencing student-directed use of resultant feedback.

72
As can be seen from inspection of Table 2, all groups obtained very low scores in the pretest. In the low socio-economic control group, the average number of items correct was 0.7 and the standard deviation (variability of the distribution) of the scores was 0.7. Students in the higher socio-economic control group achieved an average score of 2.2 items correct on the pretest with a standard deviation of 2.7. Similar scores on the pretest were obtained by the experimental groups. The low socio-economic experimental group had an average score of 1.6 items correct and the standard deviation was 1.4. In the higher socio-economic experimental group, the mean number of items correct on the pretest was 2.0 and the standard deviation was 1.8.

These results indicate that prior to the experiment, subjects generally obtained only one or two items correct out of the seventeen items in the psychomotor test. The relatively low values obtained for the standard deviations show that there was low variability among the subjects. Thus, most of the subjects were clustered on the low end of the scale with very few items correct on the pretest.

In the posttest, all groups improved considerably in performance. However, the gain was greater in the experimental than in the control group. The mean for the low socio-economic control group was 8.1 and the standard deviation was 4.1, while in the low socio-economic experimental group the mean was 15.3 and the standard deviation
Table 2

Comparison of Number of Correct Responses for Teacher-Directed Use of Feedback (Experimental) and Student-Directed Use of Feedback (Control) Using the Psychomotor Testing Instrument on Ninth Grade Girls Attending Ravenswood From October - December, 1972*

<table>
<thead>
<tr>
<th>ECONOMIC GROUPS</th>
<th>PRETEST</th>
<th>POSTTEST</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CONTROL GROUPS</td>
<td>EXPERIMENTAL GROUPS</td>
</tr>
<tr>
<td></td>
<td>MN    SD    N</td>
<td>MN    SD    N</td>
</tr>
<tr>
<td>Low Socio-Economic</td>
<td>0.7    0.7  10</td>
<td>1.6    1.4  14</td>
</tr>
<tr>
<td>High Socio-Economic</td>
<td>2.2    2.7  14</td>
<td>2.0    1.8  8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The psychomotor test consisted of 17 objectives or test items.
was 2.6. In the control group, the higher socio-economic students scored a mean of 11.1 and a standard deviation of 2.9. The higher socio-economic subjects obtained a mean of 12.9 and a standard deviation of 4.1 in the experimental group. This data can be inspected in Table 2.

The difference between the high socio-economic group in the control and experimental groups was much smaller than in the low socio-economic groups. In the high socio-economic control group, the average score was 11.1 out of the seventeen items; and in the high socio-economic experimental group, the mean was 12.9 out of the seventeen test items. (Refer to Figure 1.)

Figure 1

Gain in Psychomotor Scores in Experimental and Control Groups at Two Socio-Economic Levels
The results of the covariance analysis performed on the data are given in Table 3. As can be seen from the table, the covariate has a significant effect on the results at the .05 level. Thus, the performance on the pretest predicts performance on the posttest to some extent. (See Table 3, covariates.) This effect is removed, however, in the other analyses shown in the table.

The main treatment effect is highly significant, and there is a marked difference between the teacher-directed use of feedback (experimental group) and the student-directed use of feedback (control group). (See Table 3.) The probability of obtaining such a difference by chance alone, if the null hypothesis were true, is less than .001.

Interpretation of the results is made difficult by the fact that there is also a significant interaction between the treatment and the socio-economic levels at the .05 level. Thus, the effectiveness of the teacher feedback treatment versus the control is dependent on the socio-economic group which is involved.

II. TREATMENT EFFECT ON ITEMS OF TEST

Next, an analysis of the individual items was performed using the chi-square statistic. The teacher-directed use of feedback treatment versus the control treatment produced different effects on different items. Since the sample sizes were small, no breakdown was made
Table 3

Analysis of Covariance to Compare Gains in Psychomotor Scores in Teacher-Directed Use of Feedback (Experimental) and Student-Directed Use of Feedback (Control)

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Probability Under H.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariates...........................</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest</td>
<td>45.120</td>
<td>1</td>
<td>45.120</td>
<td>4.4</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>45.120</td>
<td>1</td>
<td>45.120</td>
<td>4.4</td>
<td>.04</td>
</tr>
<tr>
<td>Main Effects</td>
<td>249.529</td>
<td>2</td>
<td>124.764</td>
<td>12.16</td>
<td>.001</td>
</tr>
<tr>
<td>Socio-Economic</td>
<td>34.545</td>
<td>1</td>
<td>34.545</td>
<td>3.4</td>
<td>.07</td>
</tr>
<tr>
<td>Treatment (Experimental vs. Control)</td>
<td>249.526</td>
<td>1</td>
<td>249.526</td>
<td>24.3</td>
<td>.001</td>
</tr>
<tr>
<td>Interaction</td>
<td>59.408</td>
<td>1</td>
<td>59.408</td>
<td>5.79</td>
<td>.02</td>
</tr>
<tr>
<td>Socio-Economic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>59.408</td>
<td>1</td>
<td>59.408</td>
<td>5.79</td>
<td>.02</td>
</tr>
<tr>
<td>Residual</td>
<td>420.438</td>
<td>41</td>
<td>10.255</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>786.974</td>
<td>45</td>
<td>17.488</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
for socio-economic level in this analysis and the analyses were performed on the total experimental group and the total control group. A significance level of .01 was used since a number of differences would be expected to occur by chance when so many different items were analyzed.

**Treatment effects.** The results of the chi-square analyses for the individual items are given in Table 4. As can be seen from inspection of Table 4, failure on the pretest was quite high for most of the items. Thus, a high proportion of the twenty-four control subjects and the twenty-two experimental subjects were included in the calculations for most of the items.

In Table 4, the heading "gainers" denotes the percentage of subjects of the group failing the item on the pretest who passed the item on the posttest. The heading "number" indicates the number of students who failed the pretest and passed the posttest. The last two columns in the table give the chi-square values ($\chi^2$) and associated probability levels (P) obtained when the percent gainers were compared in the experimental and control groups. As can be seen from the table, only four of the seventeen items (objectives) were significant at the .01 level. For these items, the percent gainers was higher in the group receiving the experimental treatment than in the control group. As also shown in Table 4, concerning the thirteen non-significant items, the percent gainers was higher, but
Table 4
Comparison of Percentage Gainers of Teacher-Directed Use of Feedback (Experimental) and Student-Directed Use of Feedback (Control) By Chi-Square Analysis

<table>
<thead>
<tr>
<th>Test Items/Obj.</th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
<th>(x^2)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\dagger) Pretest Number</td>
<td>**Post-test Number</td>
<td>(%)</td>
<td>(\dagger) Pretest Number</td>
</tr>
<tr>
<td>101</td>
<td>16</td>
<td>16</td>
<td>100</td>
<td>15</td>
</tr>
<tr>
<td>103</td>
<td>18</td>
<td>14</td>
<td>78</td>
<td>17</td>
</tr>
<tr>
<td>104</td>
<td>21</td>
<td>20</td>
<td>95</td>
<td>24</td>
</tr>
<tr>
<td>109</td>
<td>19</td>
<td>8</td>
<td>42</td>
<td>20</td>
</tr>
<tr>
<td>110</td>
<td>21</td>
<td>20</td>
<td>95</td>
<td>24</td>
</tr>
<tr>
<td>111</td>
<td>20</td>
<td>13</td>
<td>65</td>
<td>22</td>
</tr>
<tr>
<td>116</td>
<td>15</td>
<td>15</td>
<td>100</td>
<td>23</td>
</tr>
<tr>
<td>117</td>
<td>22</td>
<td>21</td>
<td>96</td>
<td>23</td>
</tr>
<tr>
<td>118</td>
<td>22</td>
<td>15</td>
<td>68</td>
<td>23</td>
</tr>
<tr>
<td>120</td>
<td>18</td>
<td>17</td>
<td>94</td>
<td>21</td>
</tr>
<tr>
<td>129</td>
<td>17</td>
<td>14</td>
<td>82</td>
<td>21</td>
</tr>
<tr>
<td>130</td>
<td>20</td>
<td>19</td>
<td>95</td>
<td>22</td>
</tr>
<tr>
<td>132</td>
<td>22</td>
<td>21</td>
<td>96</td>
<td>24</td>
</tr>
<tr>
<td>133</td>
<td>21</td>
<td>17</td>
<td>91</td>
<td>22</td>
</tr>
<tr>
<td>139</td>
<td>21</td>
<td>17</td>
<td>81</td>
<td>21</td>
</tr>
<tr>
<td>140</td>
<td>21</td>
<td>18</td>
<td>86</td>
<td>24</td>
</tr>
<tr>
<td>142</td>
<td>21</td>
<td>16</td>
<td>76</td>
<td>24</td>
</tr>
</tbody>
</table>

\(\%\) of subjects who failed the pretest and passed the posttest.

**Number of students who failed the pretest and passed the posttest.

\(\dagger\) Number of students who failed the pretest.
not significantly so, in the experimental group than in the control group for all items except one, item number 109, that of performing a headstand.

When grouping items, among the four items measuring skills on the uneven parallel bars, two items emerged as significant. One of these items was lifting the leg over the bar from the front support position on the low bar (item 117). This yielded a chi-square of 11.85 and a probability under the null hypothesis of .001. Performing a straddle mount on the uneven parallel bars (item 118) gave a chi-square of 6.40 and a probability under the null hypothesis of .01. Among the non-significant uneven parallel bar items was performing a front support on the low bar (item 116), which indicated a chi-square of 2.89 and a probability under the null hypothesis of .09. Performing a mill circle (item 120) was the final bar skill tested, with a chi-square of 2.10 and a probability under the null hypothesis of .15.

Of the three vaulting skills on the horse, one showed a significant treatment effect, while the other two just missed reaching significance at the .01 level. The significant item in this group was the squat vault over the horse (item 142) which gave a chi-square of 6.63 and a probability under the null hypothesis of .01. The other two items in this group had probabilities of .03 associated with the obtained values of chi-square under the null hypothesis. The tasks performed for the latter two items were landing
on the horse in a squat position (item 139) and landing on the horse in a straddle position (item 140).

Among the six tumbling skills, one reached significance at the .01 level and one item came close to attaining a significant value in the chi-square test. For the task of spotting the backward roll (item 104), the chi-square was 12.15 and the probability under the null hypothesis was .001. The tumbling skill of performing a headstand for one second (item 111) had a chi-square of 4.59 and a probability of .03 under the null hypothesis. Performing a forward roll and finishing in a standing position (item 101) yielded a chi-square of .61 and a probability under the null hypothesis of .44. Performing a backward roll and finishing in a standing position (item 103) indicated a chi-square of 2.34 and a probability of .13. Performing a headstand for a minimum of three seconds resulted in a chi-square of .64 and a probability of .43, while spotting a headstand (item 110) indicated a chi-square of .15 and a probability under the null hypothesis of .70.

There were no significant results among the four balance beam objectives but one, that of performing a front scale (item 129) just missed reaching significance at the .01 level. The chi-square for the latter item was 5.84 and the probability under the null hypothesis was .02. Taking at least four skipping steps on the balance beam (item 130) gave a chi-square of 3.30 and a probability of .07, while taking at least two walking steps and one jump and repeat-
ing this action (item 132) gave a chi-square of 2.31 and a probability of .13. The remaining balance beam skill, that of performing a tip-toe turn (item 133), indicated a chi-square of .37 and a probability under the null hypothesis of .54.
Chapter V

CONCLUSIONS BASED UPON THE INVESTIGATION AND RECOMMENDATIONS FOR FURTHER STUDY

This investigation was concerned with the exploration of feedback methods resulting from the use of the Comprehensive Achievement Monitoring tool. Specific comparisons were made between teacher-directed and student-directed methods of feedback as revealed by a statistical analysis of the attainment of psychomotor skills in a gymnastics class.

The following conclusions and recommendations resulted from this study. They are outlined in the two sections which follow:

I. CONCLUSIONS DRAWN FROM THE INVESTIGATION

The following conclusions were drawn as a result of this study. They are outlined under three sub-headings:
(a) Statistical Conclusions; (b) Informal Observations; and, (c) Conclusions Concerned With Trends.

Statistical Conclusions

The significant results of the research study include:

1. When using the measuring instrument, prior to the research study, the inter-rater reliability was very high between the participating teachers and the
gymnastics expert.

2. Teacher-directed use of feedback (experimental group) produced significantly better gymnastic skill accomplishment than did the student-directed use of feedback (control group).

3. Teacher-directed use of feedback was more effective for the lower socio-economic experimental group than the lower socio-economic control group.

4. Teacher-directed use of feedback increased student learning on four of the test items significantly more than did the student-directed method of feedback usage. These items were: (a) lifting the leg over the low bar of the uneven parallel bars from the front support position; (b) performing a straddle mount on the uneven parallel bars; (c) performing a squat vault over the horse; (d) spotting (assisting the performer) the backward roll in tumbling.

There was no other significant difference between the teacher-directed use of feedback and the student-directed use of feedback.

Informal Observations

In this investigation, the researcher made the following observations relative to the student, the class schedule, the CAM structure, the feedback and the teacher:

1. Freshmen girls appear to be interested in achievement in school and motivated toward that end through
a structured approach to learning, evaluation and feedback usage.

2. Subjects in the low socio-economic groups appeared to be more interested in the CAM tool and the resultant feedback than those subjects in the high socio-economic groups.

3. Prior to the second, third and fourth test administration, students seemed to be interested in taking the CAM test.

4. The scheduling of classes should reflect the consideration of the time needed to process the feedback data. Teacher inconvenience would be reduced if all classes using the CAM tool would be scheduled after ten o'clock in the morning. This organization would insure that the feedback would be returned to the teacher at the beginning of the school day, allowing him time to diagnose and plan the activities for that day.

5. The structure of CAM as designed for the gymnastics model could be adapted to other areas of the physical education curriculum.

6. A school district should be committed financially to computer-assisted instruction to encourage curriculum development.

7. Feedback resulting from the use of CAM may be directed to course revision, deletion, accountability within the total school curriculum, and to justification of financial expenditures.
8. The teacher may have to undertake an excessive workload during the initial stage of adaptation and use of the CAM tool.

Conclusions Concerned With Trends

Several patterns or trends were revealed by an examination of the literature and of the present study:

1. In studies investigating the advantages of feedback to student-teachers in general education, the results were consistently supportive of the notion of feedback communication.

2. Past research in physical education and gymnastics seemed to display a lack of interest in the teaching process, including evaluation and the use of feedback. Research efforts appeared to focus on the aspects of class discipline, organization and management.

3. Current studies in physical education and gymnastics indicate an interest in exploring teaching and evaluation methods using a variety of resources, including feedback.

4. Current research in physical education and gymnastics recognizes the merits of educational media. Several studies used the computer to compile, store or release information beneficial to the student and teacher.

5. With increased familiarity with the CAM tool, the participating teachers became more aware of student and teacher reaction to the process. Patterns of
consistency, concern for individual achievement and positive student-teacher rapport emerged as the study progressed.

II. RECOMMENDATIONS FOR FURTHER STUDY

It is hoped that the findings of this work will help to motivate physical educators to explore the use of feedback as a result of using the Comprehensive Achievement Monitoring or any other individualized evaluation tool. The following suggestions are considered by the author to be among the most important:

1. Depth studies should be conducted to explore the use of CAM to measure skill and knowledge in the cognitive, affective and psychomotor domain.

2. Research should be done to structure the CAM tool to measure the skill of the intermediate and advanced performer.

3. Investigations should be conducted concerning the adaptation of CAM to judging the competitive area of girls' and women's gymnastics.

4. Further content analyses should be made to determine the significance of each of the major components of CAM: (a) the performance objective; (b) the administration of tests; (c) the teacher use of feedback; (d) the student use of feedback; (e) the use of the computer to compile, store and print the feedback.

5. Studies should be conducted by social scientists to discover the impact of the CAM tool on various ethnic and age groups.
III. SUMMARY

The current study has answered certain questions concerning the use of feedback as generated from the measurement of psychomotor skills in a ninth grade girls' gymnastics class. The feedback resulted from the use of the Comprehensive Achievement Monitoring tool for evaluation. It is hoped that this information will be useful to teachers of gymnastics and other physical education subjects at the high school and college level. In addition, administrators, supervisors and consultants in physical education, at all grade levels, may find this information of educational significance. Lastly, in determining educational accountability based on student performance, CAM and the feedback resulting from the use of this tool may prove to be beneficial to the justification of the discipline of physical education.

Since the area of gymnastics for girls and women has reported little research, it is hoped that this investigation will prove to stimulate other studies concerning evaluation of learning and use of feedback. Additional research efforts should: (a) explore measurement and the use of feedback in the psychomotor, cognitive and affective domain; (b) stimulate the development of instruments designed to measure intermediate, advanced and competitive skills in gymnastics; and, (c) explore measurement and the use of feedback in various age and ethnic groups.
BIBLIOGRAPHY
BIBLIOGRAPHY

A. BOOKS


B. PERIODICALS


Smoll, Frank L. "Effects of Precision of Information Feedback Upon Acquisition of a Motor Skill," Research Quarterly, 43 (December, 1972), 489-492.


C. OTHER SOURCES


D. UNPUBLISHED WORKS


"Comprehensive Achievement Monitoring...A Technique for Instructional Management." New York: The State Education Department, The Division of Research, The Bureau of School and Cultural Research, 1971. (Mimeographed.)


Nixon, John E. Personal interview. October 26, 1975.


San Mateo County Planning Department, "Comparative Data... Housing Units By Type of Occupancy and Median Family and Per Capita Income--1970." Redwood City: County Government Center, 1970. (Mimeographed.)

San Mateo County Planning Department, "Comparative Data... Population By Race--1970." Redwood City: County Government Center, 1970. (Mimeographed.)


APPENDIX
APPENDIX A
GYMNASTICS TEST INSTRUMENT
1972

GYMNASTICS

101 OBJECTIVE/TEST ITEM: You will perform a forward roll in good form and finish in a standing position.

VERBAL DESCRIPTION

1. Starting position - Put your feet and knees together in a deep squat position. Place your hands on the mat with your arms outside your knees.

2. Action - Tuck your head to look at the stomach and raise your hips over your head. Bend your arms, lowering the upper back to the mat. Extend your knees, roll over to a standing position.

3. Finish - End with your feet and legs together, your weight on the balls of your feet, your arms extended in front of your body and straighten to a stand.

COMPETENCY EXPECTATION

You will complete the forward roll in good balance.

TEST DIRECTION

Do a forward roll in good form and finish in a standing position.

102 OBJECTIVE/TEST ITEM: You will spot a forward roll.

VERBAL DESCRIPTION

1. Starting position - Kneel on the side of the performer and place the near hand on the back of the head to assist her in tucking her head.

2. Action - Place your far hand under the performer's thigh to assist her in getting her hips up and over her head.
3. Finish - Keep your hand on the performer's thigh to assist her in returning to the standing position.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with the performer to guide her throughout the movement (assistance).

TEST DIRECTION

Spot a forward roll.

103 OBJECTIVE/TEST ITEM: You will perform a backward roll in good form and finish in a standing position.

VERBAL DESCRIPTION

1. Starting position - Put your feet and knees together in a deep squat position. Place your arms on the outside of your legs, hands on the mat partially supporting the body weight.

2. Action - Tuck your chin toward your chest; and using your arms, push the body backward. Place your hands, palms up, to the side of your neck with your fingers pointing toward the ceiling. Keep your body tucked, your back rounded, and roll backward onto the hands. Push with your arms allowing the hips to go over the head.

3. As the balls of your feet touch the mat, return to a standing position.

COMPETENCY EXPECTATION

You will complete the backward roll in good balance.

TEST DIRECTION

Do a backward roll in good form and finish in a standing position.
104 OBJECTIVE/TEST ITEM: You will spot a backward roll.

VERBAL DESCRIPTION

1. Starting position - Stand behind, and to the side, of the performer.
2. Action - As the hips pass over the head, grasp the sides of the hips and lift them upward and backward.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with the performer to guide her throughout the movement (assistance).

TEST DIRECTION

Spot a backward roll.

105 OBJECTIVE/TEST ITEM: You will perform a forward straddle roll in good form and finish in a straddle position.

VERBAL DESCRIPTION

1. Starting position - Stand in a wide straddle position.
2. Action - Place your hands under your shoulders, tuck your head and shoulders, roll forward, keeping your legs in a straddle position. Place your hands between your legs and push against the mat leaning forward from the hips.
3. Finish - End in a wide straddle standing position with the hands inside the legs.

COMPETENCY EXPECTATION

You will complete a forward straddle roll in good balance.

TEST DIRECTION

Do a forward straddle roll and finish in a straddle position.
106 OBJECTIVE/TEST ITEM: You will spot a forward straddle roll.

VERBAL DESCRIPTION

1. Starting position - Stand behind the performer.
2. Action - As the performer completes the roll, place both hands on her hips (waist), lift her hips upward and forward to a straddle position.

COMPETENCY EXPECTATION

You will place your hands on the performer and assist her to a standing position.

TEST DIRECTION

Spot a forward straddle roll.

107 OBJECTIVE/TEST ITEM: You will do a backward straddle roll in good form and finish in a straddle position.

VERBAL DESCRIPTION

1. Starting position - Stand in a wide straddle position.
2. Action - Lean backward in a wide straddle position with your hips to the rear. Place your hands on the floor momentarily between your legs as the weight falls backward, then shift your hands to the mat (near the ears).
3. Finish - End in a straddle standing position.

COMPETENCY EXPECTATION

You will complete a backward straddle roll in good position.

TEST DIRECTION

Do a backward straddle roll and finish in a straddle position.

108 OBJECTIVE/TEST ITEM: You will spot a backward straddle roll.
VERBAL DESCRIPTION

1. Starting position - Stand to one side in back of the performer.
2. Action - As the performer's hands are placed by her shoulders and her hips are in the air, grasp the hips and lift the performer to a standing straddle position.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with her throughout the performance, assisting her to a standing position.

TEST DIRECTION

Spot a backward straddle roll.

109 OBJECTIVE/TEST ITEM: You will perform a headstand, balancing with the legs together and straight, for a minimum of three seconds.

VERBAL DESCRIPTION

1. Starting position - From a squat position, place your hands on the mat a shoulder distance apart. Form a triangle by placing your head on the mat, at the forward part of the head, in front of the hands.
2. Action - Place your hips above the shoulders with the legs tucked. Extend your legs upward, into the air, directly over the hips, keeping your legs together.

COMPETENCY EXPECTATION

You will balance in this position for a minimum of three seconds.

TEST DIRECTION

Do a headstand, balancing with the legs together and straight, for a minimum of three seconds.
OBJECTIVE/TEST ITEM: You will spot a headstand.

VERBAL DESCRIPTION

1. Starting position - Stand in a side stride position directly behind the performer. Place the side of the leg against the performer's back.
2. Action - Guide the performer's hips upward to a balanced position over the head. Hold the legs to prevent the body from falling past vertical position.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with the performer to guide her throughout the movement (assistance).

TEST DIRECTION

Spot a headstand.

OBJECTIVE/TEST ITEM: You will perform a headstand, balanced and stretched, for a minimum of one second.

VERBAL DESCRIPTION

1. Starting position - Place your hands on the mat a shoulder distance apart. Keep your head in a normal position between the arms.
2. Action - Kick one leg upward and forward as your hips move forward over the head and hands. After pushing-off from the ground, lift your other leg upward, bringing both legs together over your hips. Hit the balance position with the head, hips and legs in line.

COMPETENCY EXPECTATION

You will balance in this position for a minimum of one second.

TEST DIRECTION

Do a handstand, balanced and stretched, for a minimum of one second.
OBJECTIVE/TEST ITEM: You will perform a front limber in good form and finish in a standing position.

VERBAL DESCRIPTION

1. Starting position - Begin in a standing position and kick up into a handstand position.
2. Action - Drop your legs over your head and arch your back; push your hips upward and forward and push off the mat with your hands.
3. Finish - End in an erect standing position.

COMPETENCY EXPECTATION
You will perform a front limber, passing through a balanced standing position and finishing in a balanced standing position.

TEST DIRECTION
Do a front limber in good form and finish in a good standing position.

OBJECTIVE/TEST ITEM: You will spot a front limber.

VERBAL DESCRIPTION

1. Starting position: Stand to the side of the performer.
2. Action - As the performer begins to drop her legs from the handstand position into the arch, place your "near" hand under the performer's shoulders (upper back), and place your "far" hand under the performer's hips to help her to a standing position.

COMPETENCY EXPECTATION
You will keep your hands on the performer and move with her to guide her throughout the movement.

TEST DIRECTION
Spot a front limber.
114 OBJECTIVE/TEST ITEM: You will perform a cartwheel in good form and finish in a standing position.

VERBAL DESCRIPTION

1. Starting position: Face forward, lift your arms overhead, and step forward onto the front foot.
2. Action - Kick the back leg upward and reach forward with the first hand. Place the second hand on the mat and pass through a straddle handstand position. 
3. Finish - As the first leg touches the mat, the second hand comes off the mat. Come to a straddle standing position.

COMPETENCY EXPECTATION

You will perform the cartwheel, keeping the body fully stretched and extended throughout the movement.

TEST DIRECTION

You will do a cartwheel in good form and finish in a standing position.

115 OBJECTIVE/TEST ITEM: You will spot a cartwheel.

VERBAL DESCRIPTION

1. Starting position - Stand in the back of the performer.
2. Action - Cross your arms and place your hands on the performer's waist; arms will cross and uncross again.

COMPETENCY EXPECTATION

Keep your hands on the performer's waist and move with her throughout the performance.

TEST DIRECTION

Spot a cartwheel.

116 OBJECTIVE/TEST ITEM: You will perform a front support on the low bar of the uneven parallel bars and hold the position for one second.
VERBAL DESCRIPTION

1. Starting position - Grasp the low bar with both hands, palms of your hands facing toward the body (over-grip).
2. Action - Bend your knees and jump upward, push your body upward by extending your arms, until the hips touch the low bar. Keep your arms extended, your head up with your back slightly arched, and your legs together and straight. Keep your shoulders forward of the bar, lean forward slightly. Your body line should show a slight arch from head through torso to toes.

COMPETENCY EXPECTATION

This position is to be held for one second.

TEST DIRECTION

Do a front support on the low bar of the uneven parallel bars and hold position for one second.

117 OBJECTIVE/TEST ITEM: From a front support position, you will lift your leg over the bar of the uneven parallel bars.

VERBAL DESCRIPTION

1. Starting position - Do a front support.
2. Action - Keep your leg extended and lift it upward and sideward over the bar. Lean to the opposite or other side. Lift your hand off the bar to allow the leg to pass under it.
3. Finish - Replace your hand on the bar and end in a stride position.

COMPETENCY EXPECTATION

You should perform the skill without allowing the knee, lower leg or foot to touch the bar.

TEST DIRECTION

From a front support position, lift your leg over the low bar to a stride
OBJECTIVE/TEST ITEM: You will perform a straddle mount on the uneven parallel bars.

VERBAL DESCRIPTION

1. Starting position - Facing the low bar, jump to the high bar.
2. Action - Force your hips backward and lift your legs upward and sideward in a wide straddle; as hips move forward, place the backs of your thighs on the low bar with your legs in a wide straddle position.
3. Finish - Bring your legs together, keeping them extended; keep your hands on the high bar and keep your back straight.

COMPETENCY EXPECTATION

You should perform the skill with your legs moving in a continuous motion without allowing your knee, lower leg, or foot to touch the bar.

TEST DIRECTION

Perform a straddle mount on the uneven parallel bars.

OBJECTIVE/TEST ITEM: You will spot a straddle mount on the uneven parallel bars.

VERBAL DESCRIPTION

1. Action - Stand behind the performer and grasp her body at the hips to help lift her as she jumps to the high bar; help lift her hips as she lifts her legs upward in straddle position.

COMPETENCY EXPECTATION

Keep your hands on the performer and help guide her throughout the movement.

TEST DIRECTION

Spot a straddle mount on the uneven parallel bars.
120 OBJECTIVE/TEST ITEM: You will perform a mill circle.

VERBAL DESCRIPTION

1. Starting position - Take a stride sitting position with both legs extended. Grip the bar with the palms of the hands facing forward. Keep your back straight, and head up, looking forward. Lift your body off the bar, keeping the thigh on the back leg against the bar.

2. Action - Reach forward (stretch) with the front leg. Your body and hands rotate around the bar, and your legs remain extended and fully split.

3. Finish - Return to the stride support position.

COMPETENCY EXPECTATION

You will perform at least three-fourth's of a mill circle.

TEST DIRECTION

Do a mill circle.

121 OBJECTIVE/TEST ITEM: You will spot a mill circle.

VERBAL DESCRIPTION

1. Starting position - Stand between the bars and place the near hand and arm under the bar and grasp the performer's wrist.

2. Action - As the performer comes under the bar, use the far hand under the low back to assist her to the starting position.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with the performer to guide her throughout the movement.

TEST DIRECTION

Spot a mill circle.
OBJECTIVE/TEST ITEM: You will perform a front hip circle dismount off the high bar of the uneven parallel bars.

VERBAL DESCRIPTION

1. Starting position - Stand on the low bar facing the high bar and grasp the high bar with the reverse grip.
2. Action - Jump to a front support on the high bar, roll over the top of the bar keeping your body piked, and come to a long hanging position.
3. Finish - End standing under the high bar.

COMPETENCY EXPECTATION

You will perform the front hip circle dismount off the high bar (front pike forward roll).

TEST DIRECTION

Do a front hip circle dismount (front pike forward roll) off the high bar.

OBJECTIVE/TEST ITEM: You will spot a front hip circle dismount off the high bar of the uneven parallel bars.

VERBAL DESCRIPTION

1. Starting position - Stand underneath the high bar with your back to the low bar.
2. Action - After the dismount is started, reach for the performer's hips to ease her down to a long hanging position.

COMPETENCY EXPECTATION

As soon as you can reach the performer's waist, you will keep your hands on her waist throughout the skill.

TEST DIRECTION

Spot a front hip circle dismount off the high bar of the uneven parallel bars.

OBJECTIVE/TEST ITEM: You will do the back pull-over mount on the low bar of the uneven parallel bars.
VERBAL DESCRIPTION

1. Starting position - Stand facing the low bar with your hands grasping the bar in an overgrip.
2. Action - Pull with your arms (keeping your chin just above the low bar); kick one leg upward and forward from the hip (keeping your knee straight). Push with the support leg and continue circling the bar and finish in a front support position.
3. Finish - End in a front support position.

COMPETENCY EXPECTATION

Do a back pullover mount to a front support position on the low bar of the uneven parallel bars in good form.

TEST DIRECTION

Do a back pull-over mount to a front support on the low bar of the uneven parallel bars.

125 OBJECTIVE/TEST ITEM: You will spot a back pull-over mount on the low bar of the uneven parallel bars.

VERBAL DESCRIPTION

1. Starting position - Stand to one side in front of the low bar.
2. Action - Help the performer lift her hips upward toward the low bar. After the legs are lifted upward over the bar, quickly shift the spot to the performer's upper arms and shoulders.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with her to give her support throughout the movement.

TEST DIRECTION

Spot a back pull-over mount on the low bar of the uneven parallel bars.
126 OBJECTIVE/TEST ITEM: You will perform a single leg kick to a front support over the high bar on the uneven parallel bars (back pull-over).

VERBAL DESCRIPTION

1. Starting position: Hang (over-grip) on the high bar with the thighs resting on the low bar (rear hang position).
2. Bend one knee placing your foot on the low bar. Keep your other leg straight. Push from your bent leg and, at the same time, kick the straight leg upward and backward over the high bar and simultaneously pull with the arms.
3. Finish - End in a front support on the high bar.

COMPETENCY EXPECTATION

You will perform a single leg kick to a front support (back pull-over) on the high bar.

TEST DIRECTION

Do a single leg kick to a front support (back pull-over) over the high bar on the uneven parallel bars.

127 OBJECTIVE/TEST ITEM: You will spot a single leg kick to a front support on the high bar of the uneven parallel bars.

VERBAL DESCRIPTION

1. Starting position - Stand between the bars, underneath and to the side of the performer.
2. Action - Assist by giving the performer's hips a push upward and over the high bar.

COMPETENCY EXPECTATION

As soon as you can reach the performer, keep your hands on her throughout the movement.

TEST DIRECTION

Spot a single leg kick to a front support over the high bar of the uneven parallel bars.
128 OBJECTIVE/TEST ITEM: From the front support position, you will lift your leg over the balance beam performing a straddle seat mount on the beam.

VERBAL DESCRIPTION

1. Starting position - Get in the front support position.
2. Action - Keeping your leg extended, lift it sideward and upward across the beam. Shift your hands to have your thumbs together on top of the beam.
3. Finish - Finish in a straddle-sit position with your legs extended.

COMPETENCY EXPECTATION

Your leg should be in continuous movement and it should not touch the beam.

TEST DIRECTION

From the front support position, do a straddle seat mount on the beam.

129 OBJECTIVE/TEST ITEM: You will perform a standing front scale in good form, balancing for two seconds.

VERBAL DESCRIPTION

1. Starting position - Stand on the beam and face it lengthwise.
2. Action - Stand on one leg, lifting the other leg upward to the rear of your body. Keep your knees of both legs straight and your back arched and head high. Keep a continuous line from head through your torso to toes.

COMPETENCY EXPECTATION

Hold your balance in this position for two seconds.

TEST DIRECTION

Do a standing front scale in good form, balancing for two seconds.
130 OBJECTIVE/TEST ITEM: You will take at least four skipping steps (step-hops) on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Stand on the beam.
2. Action - Take four or more skips (step-hops) on the balance beam.

COMPETENCY EXPECTATION

When skipping along the beam, your support foot must leave the beam.

TEST DIRECTION

Take at least four skipping steps (step-hops) on the balance beam.

131 OBJECTIVE/TEST ITEM: You will spot at least four skipping steps on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Stand beside the performer and extend one arm and hand up so that she can grasp it if needed.
2. Action - Walk along beside the performer.

COMPETENCY EXPECTATION

You must follow the performer up and down the beam.

TEST DIRECTION

Spot a performer skipping on the balance beam.

132 OBJECTIVE/TEST ITEM: You will take at least two walking steps and one jump, at least two more walking steps and one jump along the length of the beam.

VERBAL DESCRIPTION

1. Starting position - Stand on the beam.
2. Action - Take at least two walking steps and one jump and at least two more walking steps and one jump along the length
of the beam.

COMPETENCY EXPECTATION

When jumping, your support foot must leave the beam.

TEST DIRECTION

Take at least two walking steps and one jump and two more walking steps and one jump along the length of the balance beam.

133 OBJECTIVE/TEST ITEM: You will perform a tip-toe turn on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Stand on the beam with your feet close together (one in front of the other).
2. Action - Extend your ankles and lift the heels off the beam, turning only the balls of the feet on the beam. Pivot on the balls of the feet in the direction of the rear foot.
3. Finish - Finish the turn on the balls of the feet.

COMPETENCY EXPECTATION

You will do a 180 degree turn in good balance.

TEST DIRECTION

Do a tip-toe turn on the balance beam.

134 OBJECTIVE/TEST ITEM: You will perform a squat turn on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Stand with one foot in front of the other and squat down in a deep crouch position with your back straight.
2. Action - Pivot on the balls of both feet in a deep crouch position. Make a half turn to face the opposite direction.
3. Finish - End in a deep squat position facing the opposite direction.
COMPETENCY EXPECTATION

You will do a 180 degree turn in good balance.

TEST DIRECTION

Do a squat turn on the balance beam.

135 OBJECTIVE/TEST ITEM: You will perform a "V" seat on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Sit on the beam (facing lengthwise) with your hands grasping the beam behind the hips and your legs tucked into the chest.
2. Action - Lift both legs from a bent position to full extension, balance on the buttocks with the body in a good pike position (90 degree), with the arms extended laterally to sides of the body.

COMPETENCY EXPECTATION

You will balance in a "V" seat position for a minimum of two seconds.

TEST DIRECTION

Perform a "V" seat, with your arms and hold this position for a minimum of two seconds.

136 OBJECTIVE/TEST ITEM: You will spot a "V" seat on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Stand beside the performer.
2. Action - Place one arm across the performer's back and the other arm under her thigh.

COMPETENCY EXPECTATION

You will keep your hands on the performer throughout the movement.
TEST DIRECTION

Spot a "V" seat on the balance beam.

137 OBJECTIVE/TEST ITEM: You will do a forward roll on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Begin in a squat position.
2. Action - Lift your hips in pike position—hands on top of the beam—and tuck the head close to the body so that the roll is onto the upper back. Quickly change your hands to the under grip as your weight rolls onto your shoulders, pulling your elbows close together.
3. Finish - End in a one-leg squat (walk-out).

COMPETENCY EXPECTATION

You will complete the forward roll in good balance.

TEST DIRECTION

You will complete the forward roll in good balance.

138 OBJECTIVE/TEST ITEM: You will spot a forward roll on the balance beam.

VERBAL DESCRIPTION

1. Starting position - Stand on either side of the beam.
2. Action - Spot the performer at the hips to control the speed and direction of the roll and to keep the performer on the beam.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with her to guide her throughout the movement.

TEST DIRECTION

Spot a forward roll on the balance beam.
139 OBJECTIVE/TEST ITEM: You will land on the horse in squat position and hold the position for one second.

VERBAL DESCRIPTION

1. Action - After a two-foot take-off, lift your hips and place your hands on the top of the horse. Bring your body into tuck position as your feet swing up between your arms.
2. Finish - Land with the balls of your feet on top of the horse; stay in tight tuck position with your arms extended.

COMPETENCY EXPECTATION

You will land on the horse in a balance squat position, holding this position for one second.

TEST DIRECTION

Do a squat landing on the horse and hold this position for one second.

140 OBJECTIVE/TEST ITEM: You will land on the horse in straddle position and hold this position for one second.

VERBAL DESCRIPTION

1. Action - After a two-foot take-off, lift your hips and place your hands on the top of the horse. Your legs are spread in a straddle position as they are lifted onto the horse.
2. Finish - Hands are on the top of the horse with your arms extended; your legs are extended to the sides of the body and your head is up and focused forward.

COMPETENCY EXPECTATION

You will land on the horse in a balanced straddle position, holding this position for one second.

TEST DIRECTION

Do a straddle landing on the horse and hold this position for one second.
141 OBJECTIVE/TEST ITEM: You will spot a straddle landing.

VERBAL DESCRIPTION
1. Starting position - Stand close to, and in front of, the horse.
2. Action - As the performer mounts the horse, grasp the upper arms or shoulders to help her maintain her balance.

COMPETENCY EXPECTATION
You will keep your hands on the performer and move with her to guide her throughout the movement.

TEST DIRECTION
Spot a straddle landing on the horse.

142 OBJECTIVE/TEST ITEM: You will do a squat vault over the horse.

VERBAL DESCRIPTION
1. Action - After a two-foot take-off, lift your hips and place your hands on the horse. Tuck your knees to your chest and bring your feet through your arms.
2. Finish - Land on the balls of your feet and extend to a balanced finish position.

COMPETENCY EXPECTATION
You will go over the horse in a tuck position.

TEST DIRECTION
Do a squat vault over the horse.

143 OBJECTIVE/TEST ITEM: You will do a straddle vault over the horse.

VERBAL DESCRIPTION
1. Action - After a two-foot take-off, lift your hips and place your hands on the top of the horse. Your legs are spread in a straddle position as you pass over the horse.
2. Finish - Land on the balls of the feet and extend to a balanced finish position.
COMPETENCY EXPECTATION

You will go over the horse in a straddle position.

TEST DIRECTION

Do a straddle vault over the horse.

144 OBJECTIVE/TEST ITEM: You will spot a straddle vault.

VERBAL DESCRIPTION

1. Starting position - Stand in front of the horse.
2. Action - Reach and grasp the performer's shoulders or upper arms to assist her with the landing.

COMPETENCY EXPECTATION

You will keep your hands on the performer and move with the performer to guide her throughout the movement.

TEST DIRECTION

Spot a straddle vault.

145 OBJECTIVE/TEST ITEM: You will perform a flank vault over the horse.

VERBAL DESCRIPTION

1. Action - After a two-foot take-off, lift your hips and place your hands on top of the horse. Lift your hips upward and extend your body in a horizontal plane over the horse, keeping your shoulders, hips, and legs in line above the horse.
2. Finish - Make a quarter turn and finish with your side next to the horse. Turn in the direction of your hands.

COMPETENCY EXPECTATION

You will go over the horse and finish with a quarter turn.

TEST DIRECTION

Do a flank vault and finish with a quarter turn.
OBJECTIVE/TEST ITEM: You will perform a wolf vault over the horse.

VERBAL DESCRIPTION

1. Action - After a two-foot take-off, lift your hips and place your hands on top of the horse. Lift your hips upward, placing one leg through your hands in a squat position. Lift the other leg in an extended position to the side of the body.
2. Finish - Land with the legs together on the balls of the feet and extend to a balanced finished position.

COMPETENCY EXPECTATION

You will go over the horse in a wolf position.

TEST DIRECTION

Do a wolf vault over the horse.

OBJECTIVE/TEST ITEM: You will perform a wolf mount on the balance beam and hold the position for two seconds.

VERBAL DESCRIPTION

1. Starting position: After a two-foot take-off, place your hands on the beam and lift your hips upward, keeping your arms straight.
2. Action - Lift your hips upward, placing one leg through your hands in a squat position. Lift the other leg in an extended position to the side of the body.
3. Finish - Keep your hips low to the beam and look forward.

COMPETENCY EXPECTATION

You will remain balanced in this position for two seconds.

TEST DIRECTION

Do a wolf mount on the balance beam and hold the position for two seconds.
148 OBJECTIVE/TEST ITEM: You will do a swing-through dismount on the balance beam.

VERBAL DESCRIPTION

1. Starting position - "V" seat.
2. Action - Swing the legs downward, backward, and upward. At the same time, place your hands in front of the body on top of the beam to support the body weight. Lift the legs upward and swing them to one side of the beam, and at the same time, release one hand from the beam.
3. Finish - Land with your legs extended and together, one extended arm on the beam and the other extended arm at shoulder height and to the side of the body.

COMPETENCY EXPECTATION

You will do a "swing-through" dismount in good form.

TEST DIRECTION

Do a "swing-through" dismount on the balance beam.

149 OBJECTIVE/TEST ITEM: You will perform a basic routine on the balance beam.

VERBAL DESCRIPTION

1. Do a wolf mount on the beam.
2. Do the following skills or movements in any order: a scale, a tip-toe or squat turn, several locomotor movements, and an elevation. You may add more.
3. Do a dismount.

COMPETENCY EXPECTATION

You will perform the routine without a spotter.

TEST DIRECTION

Do the basic routine on the balance beam.
150 OBJECTIVE/TEST ITEM: You will perform a basic routine on the uneven parallel bars.

VERBAL DESCRIPTION

1. Do a straddle mount on the bars.
2. Do the following skills or movements in any order: a mill circle, a single leg kick to a front support on the high bar. You may add more.
3. Do a front hip circle dismount on the high bar.

COMPETENCY EXPECTATION

You will perform the routine without a spotter.

TEST DIRECTION

Do the basic routine on the uneven parallel bars.
## APPENDIX B

### PSYCHOMOTOR OBJECTIVES/TEST ITEMS INCLUDED IN EACH TEST ADMINISTRATION

<table>
<thead>
<tr>
<th>Test Admin. #1 (Pretest)</th>
<th>Test Admin. #2 (within unit)</th>
<th>Test Admin. #3 (within unit)</th>
<th>Test Admin. #4 (Posttest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>* 101</td>
<td>101</td>
<td>101</td>
<td>101</td>
</tr>
<tr>
<td>102</td>
<td>102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>* 103</td>
<td>103</td>
<td>103</td>
<td>103</td>
</tr>
<tr>
<td>* 104</td>
<td>104</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>* 105</td>
<td>105</td>
<td>105</td>
<td>105</td>
</tr>
<tr>
<td>106</td>
<td>106</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>* 107</td>
<td>107</td>
<td>107</td>
<td>107</td>
</tr>
<tr>
<td>108</td>
<td>108</td>
<td>108</td>
<td>108</td>
</tr>
<tr>
<td>* 109</td>
<td>109</td>
<td>109</td>
<td>109</td>
</tr>
<tr>
<td>* 110</td>
<td>110</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>* 111</td>
<td>111</td>
<td>111</td>
<td>111</td>
</tr>
<tr>
<td></td>
<td></td>
<td>112</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td></td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>* 114</td>
<td>114</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>115</td>
<td>115</td>
<td>115</td>
<td>115</td>
</tr>
<tr>
<td>* 116</td>
<td>116</td>
<td>116</td>
<td>116</td>
</tr>
<tr>
<td>* 117</td>
<td>117</td>
<td>117</td>
<td>117</td>
</tr>
<tr>
<td>* 118</td>
<td>118</td>
<td>118</td>
<td>118</td>
</tr>
<tr>
<td>119</td>
<td>119</td>
<td>119</td>
<td>119</td>
</tr>
<tr>
<td>* 120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>121</td>
<td>121</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td>122</td>
<td>122</td>
<td>122</td>
<td>122</td>
</tr>
<tr>
<td>123</td>
<td>123</td>
<td>123</td>
<td>123</td>
</tr>
<tr>
<td>124</td>
<td>124</td>
<td>124</td>
<td>124</td>
</tr>
<tr>
<td>125</td>
<td>125</td>
<td>125</td>
<td>125</td>
</tr>
<tr>
<td>126</td>
<td>126</td>
<td>126</td>
<td>126</td>
</tr>
<tr>
<td>127</td>
<td>127</td>
<td>127</td>
<td>127</td>
</tr>
<tr>
<td>128</td>
<td>128</td>
<td>128</td>
<td>128</td>
</tr>
<tr>
<td>* 129</td>
<td>129</td>
<td>129</td>
<td>129</td>
</tr>
<tr>
<td>* 130</td>
<td>130</td>
<td>130</td>
<td>130</td>
</tr>
<tr>
<td>131</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>* 132</td>
<td>132</td>
<td>132</td>
<td>132</td>
</tr>
<tr>
<td>* 133</td>
<td>133</td>
<td>133</td>
<td>133</td>
</tr>
<tr>
<td>134</td>
<td>134</td>
<td>134</td>
<td>134</td>
</tr>
<tr>
<td>135</td>
<td>135</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>136</td>
<td>136</td>
<td>136</td>
<td>136</td>
</tr>
<tr>
<td>137</td>
<td>137</td>
<td>137</td>
<td>137</td>
</tr>
<tr>
<td>138</td>
<td>138</td>
<td>138</td>
<td>138</td>
</tr>
<tr>
<td>* 139</td>
<td>139</td>
<td>139</td>
<td>139</td>
</tr>
<tr>
<td>* 140</td>
<td>140</td>
<td>140</td>
<td>140</td>
</tr>
</tbody>
</table>
APPENDIX B (continued)

<table>
<thead>
<tr>
<th>Test Admin. #1 (Pretest)</th>
<th>Test Admin. #2 (within unit)</th>
<th>Test Admin. #3 (within unit)</th>
<th>Test Admin. #4 (Posttest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>141</td>
<td>141</td>
<td>141</td>
<td>142</td>
</tr>
<tr>
<td>* 142</td>
<td>142</td>
<td>142</td>
<td>143</td>
</tr>
<tr>
<td></td>
<td>143</td>
<td>143</td>
<td>144</td>
</tr>
<tr>
<td></td>
<td>144</td>
<td>144</td>
<td></td>
</tr>
<tr>
<td>145</td>
<td>145</td>
<td>145</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>146</td>
<td>147</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td></td>
<td>149</td>
<td>150</td>
</tr>
</tbody>
</table>

*Items included in the research study.*
APPENDIX C

SKILL RATING SHEET
(Test Administration)

<table>
<thead>
<tr>
<th></th>
<th>101</th>
<th>102</th>
<th>103</th>
<th>104</th>
<th>105</th>
<th>106</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P/P</td>
<td>P/U</td>
<td>U/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
</tr>
<tr>
<td>Brown, Pat</td>
<td>P/U</td>
<td>U</td>
<td>U</td>
<td>P</td>
<td>P</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>U</td>
<td>P</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>P</td>
</tr>
<tr>
<td>Jones, Linda</td>
<td>P/P</td>
<td>P/P</td>
<td>P/U</td>
<td>U/P</td>
<td>U/U</td>
<td>P/P</td>
</tr>
<tr>
<td></td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>U/P</td>
<td>P/P</td>
</tr>
<tr>
<td>Ortega, Tracy</td>
<td>U/U</td>
<td>U/U</td>
<td>U/U</td>
<td>U/P</td>
<td>P/P</td>
<td>P/P</td>
</tr>
<tr>
<td>Peters, Judy</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>P</td>
</tr>
</tbody>
</table>

†Directions: Use "P" for a passing mark and "U" for an unachieved mark for the two sections of each objective. The first mark is for form and the second mark is for competency. To receive a total "pass", the mark below the double line, a student must pass both the form and the competency.
## APPENDIX D

**DAILY INSTRUCTION AND TEACHER ROTATION CALENDAR**

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FIRST WEEK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAM Orientation Information</td>
<td>CAM Pretest</td>
<td>CAM Pretest</td>
<td>Use of Feedback</td>
<td>Teach Objectives 101, 102, 103, 104, 109, 110, 111</td>
</tr>
<tr>
<td>Team Teaching</td>
<td>Admin. #1</td>
<td>Admin. #1</td>
<td>Experimental Teacher-Directed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teach Own Class</td>
<td>Teach Own Class</td>
<td>Control Student-Directed</td>
<td></td>
</tr>
<tr>
<td>Oct. 2</td>
<td>Oct. 3</td>
<td>Oct. 4</td>
<td>Oct. 5</td>
<td>Oct. 6</td>
</tr>
<tr>
<td><strong>SECOND WEEK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teach Objectives 116, 117, 118, 119</td>
<td>Teach Objectives 129, 130, 131, 132, 133</td>
<td>Teach Objectives 128, 139, 142</td>
<td>Teach Objectives 140, 141, 145</td>
<td></td>
</tr>
<tr>
<td>Teach Other Class</td>
<td>Teach Other Class</td>
<td>Teach Other Class</td>
<td>Teach Own Class</td>
<td>Teach Own Class</td>
</tr>
<tr>
<td><strong>THIRD WEEK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REVIEW</td>
<td>REVIEW</td>
<td>CAM Test (Within Unit Test)</td>
<td>Test Administration #2</td>
<td></td>
</tr>
<tr>
<td>Teach Own Class</td>
<td>Teach Other Class</td>
<td>Pretest Objectives...105, 106, 114, 115, 122, 123, 124, 125, 126, 127, 134, 135, 136, 143, 144. After-instruction Objectives...101, 102, 103, 104, 109, 110, 111, 116, 117, 118,119, 120, 121, 128-133, 139-142, 145</td>
<td>Test Own Class</td>
<td>Test Own Class</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Test Other Class</td>
<td>Class</td>
</tr>
</tbody>
</table>
DAILY INSTRUCTION AND TEACHER ROTATION
CALENDAR (con't)

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOURTH WEEK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finish CAM Test</td>
<td>Use of Feedback: Experimental Group will be teacher-directed and the Control Group will be student-directed.</td>
<td>Team Teaching When finished: Performers present warm-up routines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test Other Class</td>
<td>Test Own Class</td>
<td>Teach Other Class</td>
<td>Teach Own Class</td>
<td></td>
</tr>
<tr>
<td>FIFTH WEEK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teach Objectives 124, 125, 126, 127</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teach Other Class</td>
<td>Teach Own Class</td>
<td>Teach Other Class</td>
<td>Teach Own Class</td>
<td></td>
</tr>
<tr>
<td>Oct. 30</td>
<td>Oct. 31</td>
<td>Nov. 1</td>
<td>Nov. 2</td>
<td>Nov. 3</td>
</tr>
<tr>
<td>SIXTH WEEK</td>
<td>Review</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REVIEW</td>
<td>REVIEW</td>
<td>CAM Test (Within Unit Test)</td>
<td>Test Administration #3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pretest Objectives...107, 108, 112, 113, 137, 138, 146-148</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>After-instruction Objectives...105, 106, 114, 115, 122, 127, 134-136, 143, 144. Retention Objectives...101-104, 109-111, 116-121, 128-133, 139-142, 145</td>
<td></td>
</tr>
<tr>
<td>Teach Own Class</td>
<td>Teach Other Class</td>
<td>Test Other Class</td>
<td>Test Own Class</td>
<td>Test Other Class</td>
</tr>
<tr>
<td>Nov. 6</td>
<td>Nov. 7</td>
<td>Nov. 8</td>
<td>Nov. 9</td>
<td>Nov. 10</td>
</tr>
</tbody>
</table>
### Seventh Week

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finish</td>
<td>Use of Feedback: Experimental Group will be teacher-directed and the Control Group will be student-directed.</td>
<td>Test Own Class</td>
<td>Teach Other Class</td>
<td>Teach Own Class</td>
</tr>
</tbody>
</table>

#### Eighth Week

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teach Objectives 107, 108, 112, 113, 149, 150</td>
<td>Review Objectives 107, 108, 112, 113, 149, 150</td>
<td>REVIEW</td>
<td>Thanksgiving Holiday</td>
<td>Teach Other Class</td>
</tr>
</tbody>
</table>

#### Ninth Week

<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Objectives 149, 150</td>
<td>Review Objectives 149, 150</td>
<td>Review Objectives 149, 150, 146, 147</td>
<td>No Class (all-school assembly)</td>
<td>Review Objectives 149, 150, 146, 147</td>
</tr>
</tbody>
</table>

**Dates:**

- Nov. 13
- Nov. 14
- Nov. 15
- Nov. 16
- Nov. 17
- Nov. 20
- Nov. 21
- Nov. 22
- Nov. 23
- Nov. 24
- Nov. 27
- Nov. 28
- Nov. 29
- Nov. 30
- Dec. 1
<table>
<thead>
<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TENTH WEEK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review Objectives 149, 150</td>
<td>No Class</td>
<td><strong>REVIEW</strong></td>
<td><strong>REVIEW</strong></td>
<td>CAM Test (Posttest)</td>
</tr>
<tr>
<td>Planned Parent-</td>
<td>Team Teaching</td>
<td>Teach Own Class</td>
<td>Teach Other Class</td>
<td>Test Own Class</td>
</tr>
<tr>
<td>hood Discussion</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec. 4</td>
<td>Dec. 5</td>
<td>Dec. 6</td>
<td>Dec. 7</td>
<td>Dec. 8</td>
</tr>
<tr>
<td><strong>ELEVENTH WEEK</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAM Test (Posttest)</td>
<td>Test Administration #4</td>
<td>When finished: Performers present routines</td>
<td>FREE DAY</td>
<td></td>
</tr>
<tr>
<td>Posttest Objectives...101, 103-118, 120, 122-127, 129-130, 132-140, 142-144, 146-150</td>
<td>Test Other Class</td>
<td>Test Own Class</td>
<td>Test Other Class</td>
<td>Test Own Class</td>
</tr>
</tbody>
</table>
APPENDIX E

Teacher __________________
Date ___________________

CAM Teacher Log .... Fall, 1972

Objectives Taught

TAUGHT OWN CLASS  TAUGHT OTHER CLASS  TEAM-TAUGHT
(Please circle the correct situation)

Instructional Strategy Used

Positive Educational Outcomes

Problems Encountered
APPENDIX F

SUMMARY OF INSTRUCTIONAL LOG INFORMATION

Week of October 2-27, 1972

Student motivation. The students were interested in CAM. Many questions were asked during the orientation session. Student attendance was good, and there were very few girls tardy to class. Only on rare occasions did students not change clothes and participate in class.

Teaching objectives. The teacher must know the subject matter and be highly organized to be able to complete instruction on the objectives scheduled for each day. This highly structured class environment seems to promote student involvement in activity for the entire class period.

Reviewing objectives. Most of the students were interested in learning those skills which they could not perform well. A few students wandered around the room disturbing the learning of others. These girls needed stronger structure in terms of the review.

CAM test. The teacher must spend time prior to the class in completely organizing the class testing roll, reviewing the specific components of the skills to be tested, and in grouping the students for the test. Since there are many objectives to be tested, the teacher must be able to make quick, accurate judgments regarding the performance of each student. The teacher does not have a
"moment to herself".

Feedback usage. The teacher working with the experimental group had to spend at least two hours diagnosing the feedback material from the computer print-out. Since the feedback was processed the afternoon and evening after completion of the CAM test, the feedback was picked up by the teacher as late as nine o'clock in the evening or six o'clock in the morning. At this time, analysis was begun for the class session. Further study, by the teacher, took place prior to the next feedback usage day. The short time-line was difficult to meet for the teachers.

The teacher working with the control group used a student-directed, or motivated, approach to the usage of the feedback. This approach did not require much teacher preparation.

Teacher attitude. Generally, they liked the CAM tool. They were both energetic and gave of their time without hesitation. Teachers found the rotation schedule to be different. Neither positive or negative opinions were expressed at this time.

Week of October 30-November 24, 1972

Student motivation. Surprisingly, the students were still interested in CAM. Since grades were not given as a result of achievement on the CAM tests, the girls
looked forward to the tests. Attendance was still good. Students did not like the test make-up procedure. Make-ups were scheduled during the free time of the teacher and student. Perhaps this procedure helped to keep attendance high during the test days.

**Teaching objectives.** The teacher cannot "let down" at any time during the class period. If anything, she had to be more organized during this time period (see comments of prior weeks).

**Reviewing objectives.** Students seemed to be most disinterested in this phase of the CAM tool. At times it was difficult to get and keep their attention.

**CAM test.** The third test administration was unbelievable. East student had to perform every one of the objectives scheduled in that administration. This is not unlike the other testing periods; however, the number of objectives to be tested had increased. After the test was over, both teachers felt great satisfaction concerning the amount of learning which had been demonstrated by students.

**Feedback usage.** All students seemed to be interested in the computer print-out form which they received. Instruction concerning how to read the information was given to both groups during each feedback session. The connection between the printed objectives/test item sheet,
given to students at the beginning of the study, the CAM tests and the feedback results were stressed by both teachers during every feedback discussion. The few students who were not interested in their feedback, and in skill improvement, presented a slight problem to the teacher.

Teacher attitude. The work surrounding the use of CAM in the psycho-motor domain is still very time-consuming. The teachers enjoyed the rotation schedule. This schedule gave them the opportunity to experience teaching gymnastics to a wide range of students. This approach, however, necessitated close association with the other participating teacher. Meetings were held regularly to discuss all aspects of the study.

Week of November 27-December 15, 1972

Student motivation. There was great interest in learning objectives 149 and 150. These objectives were routines on the equipment. Some students still have a fear of performing on the equipment. It was noticed that these girls acted as a spotter or coach to their partner more than taking the role of the performer. Girls in both classes asked on many occasions when the final test was scheduled.

Teaching objectives. The bulk of the objectives had been taught in the earlier part of the course. In this area, the great pressure on the teacher had been lessened.
Reviewing objectives. There was more student interest in the review of skills. Perhaps this was due to the fact that the unit was almost over, and the final test was approaching.

Teacher attitude. Since class was not held for two days during this time, teachers enjoyed the "time off" from preparation. Generally, teachers concluded the CAM experience indicating a desire to use the CAM tool in a swimming unit. It was felt that a great deal of documented learning had taken place by teacher and student alike.
# APPENDIX G

## SKILL RATING SHEET
(Inter-Rater Reliability Check)

<table>
<thead>
<tr>
<th></th>
<th>Cartwheel</th>
<th>Front Hip Circle</th>
<th>Dismount</th>
<th>Squat Turn 134</th>
<th>Straddle Vault 143</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buck, Pam</td>
<td>P/P</td>
<td>P/U</td>
<td>P/P</td>
<td>U/P</td>
<td>U/P</td>
</tr>
<tr>
<td>Coonrad, Cindy</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>+P/P</td>
<td>P/U</td>
</tr>
<tr>
<td>Hendrix, Sherry</td>
<td>U/P</td>
<td>U/U</td>
<td>U/P</td>
<td>P/F</td>
<td></td>
</tr>
<tr>
<td>Hood, Nancy</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
</tr>
<tr>
<td>Howerton, Valerie</td>
<td>U/P</td>
<td>U/P</td>
<td>P/P</td>
<td>U/P</td>
<td></td>
</tr>
<tr>
<td>Kerwin, Mary</td>
<td>P/P</td>
<td>P/P</td>
<td>U/U</td>
<td>U/U</td>
<td></td>
</tr>
<tr>
<td>Kester, Vickie</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
</tr>
<tr>
<td>McDonald, Ann</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
<td>P/P</td>
</tr>
</tbody>
</table>

Psychomotor Inter-Rater Reliability Check 1 2 3

Date ____________________________

Rater ____________________________

Directions: Use a "P" for a passing mark and "U" for an unachieved mark for the two sections of each objective. The first mark is for form and the second mark is for competency. To receive a total "pass", the mark below the double line, a student must pass both the form and the competency.

†Circled objective: This is the only test item or objective not in agreement with the expert.
APPENDIX H

ITEM MATRIX

Course Number RA601  Lead Teacher Crippen  Number of Copies of Each Form 1

Information to be printed in upper left corner of test PE, Psychomotor

<table>
<thead>
<tr>
<th>Form Number</th>
<th>Number of Copies</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ques. Pos.</th>
<th>Item Number</th>
<th>W</th>
<th>Ques. Pos.</th>
<th>Item Number</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>10100</td>
<td></td>
<td>13.</td>
<td>12100</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>10200</td>
<td></td>
<td>14.</td>
<td>12800</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>10300</td>
<td></td>
<td>15.</td>
<td>12900</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>10400</td>
<td></td>
<td>16.</td>
<td>13000</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>10900</td>
<td></td>
<td>17.</td>
<td>13100</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>11000</td>
<td></td>
<td>18.</td>
<td>13200</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>11100</td>
<td></td>
<td>19.</td>
<td>13300</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>11600</td>
<td></td>
<td>20.</td>
<td>13900</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>11700</td>
<td></td>
<td>21.</td>
<td>14000</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>11800</td>
<td></td>
<td>22.</td>
<td>14100</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>11900</td>
<td></td>
<td>23.</td>
<td>14200</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>12000</td>
<td></td>
<td>24.</td>
<td>14500</td>
<td></td>
</tr>
</tbody>
</table>

Item Number = The first three numbers are the objective number (101) and the last two digits represent the specific question number. In the psychomotor CAM, the objective was the test item or question, so 00 was used to represent this.

Form Number = 11 (the pretest), 12 (the second test), 13 (the third test), and 14 (the posttest).

W = Weight of the test item. Left blank if each item was weighted equally. Completed if instructor wanted item weighted from 2-5.
APPENDIX I

INDIVIDUAL STUDENT COMPUTER FEEDBACK

Dupee, Pier C.  549147* Module 1  Crippen  11/14/72

RA601

Test Adm  3 - 11/20/72

Percentage correct on all items is 81
Percentage correct on YES items is 92

<table>
<thead>
<tr>
<th>QN</th>
<th>OBJ</th>
<th>RP</th>
<th>INS</th>
<th>QN</th>
<th>OBJ</th>
<th>RP</th>
<th>INS</th>
<th>TEST</th>
<th>FORM</th>
<th>TOTAL</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101</td>
<td>$+$</td>
<td>yes</td>
<td>25</td>
<td>125</td>
<td>$+$</td>
<td>yes</td>
<td>1</td>
<td>11</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>102</td>
<td>$+$</td>
<td>yes</td>
<td>26</td>
<td>126</td>
<td>$+$</td>
<td>yes</td>
<td>2</td>
<td>12</td>
<td>46</td>
<td>66</td>
</tr>
<tr>
<td>3</td>
<td>103</td>
<td>$+$</td>
<td>yes</td>
<td>27</td>
<td>127</td>
<td>$+$</td>
<td>yes</td>
<td>3</td>
<td>13</td>
<td>81</td>
<td>92</td>
</tr>
<tr>
<td>4</td>
<td>104</td>
<td>$+$</td>
<td>yes</td>
<td>28</td>
<td>128</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>105</td>
<td>$-$</td>
<td>yes</td>
<td>29</td>
<td>129</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>106</td>
<td>$+$</td>
<td>yes</td>
<td>30</td>
<td>130</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>107</td>
<td>$+$</td>
<td>yes</td>
<td>31</td>
<td>131</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>108</td>
<td>$-$</td>
<td>yes</td>
<td>32</td>
<td>132</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>109</td>
<td>$+$</td>
<td>yes</td>
<td>33</td>
<td>133</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>110</td>
<td>$+$</td>
<td>yes</td>
<td>34</td>
<td>134</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>111</td>
<td>$+$</td>
<td>yes</td>
<td>35</td>
<td>135</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>112</td>
<td>$-$</td>
<td>yes</td>
<td>36</td>
<td>136</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>113</td>
<td>$+$</td>
<td>yes</td>
<td>37</td>
<td>137</td>
<td>$+$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>114</td>
<td>$+$</td>
<td>yes</td>
<td>38</td>
<td>138</td>
<td>$+$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>115</td>
<td>$+$</td>
<td>yes</td>
<td>39</td>
<td>139</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>116</td>
<td>$+$</td>
<td>yes</td>
<td>40</td>
<td>140</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>117</td>
<td>$+$</td>
<td>yes</td>
<td>41</td>
<td>141</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>118</td>
<td>$+$</td>
<td>yes</td>
<td>42</td>
<td>142</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>119</td>
<td>$+$</td>
<td>yes</td>
<td>43</td>
<td>143</td>
<td>$-$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>120</td>
<td>$-$</td>
<td>yes</td>
<td>44</td>
<td>144</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>121</td>
<td>$+$</td>
<td>yes</td>
<td>45</td>
<td>145</td>
<td>$+$</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>122</td>
<td>$+$</td>
<td>yes</td>
<td>46</td>
<td>146</td>
<td>$-$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>123</td>
<td>$+$</td>
<td>yes</td>
<td>47</td>
<td>147</td>
<td>$-$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>124</td>
<td>$+$</td>
<td>yes</td>
<td>48</td>
<td>148</td>
<td>$-$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Student number

Module 1:  First morning class
RA 601:  Ravenswood Psychomotor CAM

% Correct on all items:  Includes pretest items
% Correct on all yes items:  Includes items which have been taught

Form:  Third test administration
Qn:  Order of objectives
Obj:  Objective or test item
Rp:  Response
$+$:  Pass
$-$:  Unachieve
Ins yes:  Instruction given
<table>
<thead>
<tr>
<th>Student Number</th>
<th>Name</th>
<th>Cum Avg</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>49147</td>
<td>Dupee, Pier</td>
<td>Tot</td>
<td>49</td>
<td>20</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>79</td>
<td>Ø</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Form</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>550251</td>
<td>Gadson, Deb</td>
<td>Tot</td>
<td>46</td>
<td>12</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>84</td>
<td>Ø</td>
<td>83</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Form</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>550913</td>
<td>Eakin, Elena</td>
<td>Tot</td>
<td>43</td>
<td>29</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>65</td>
<td>Ø</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Form</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>611368</td>
<td>Tracy, Jane</td>
<td>Tot</td>
<td>29</td>
<td>Ø</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>60</td>
<td>Ø</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Form</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>613470</td>
<td>Womack, Den</td>
<td>Tot</td>
<td>32</td>
<td>Ø</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>64</td>
<td>Ø</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Form</td>
<td>11</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>
**APPENDIX K**

*COMPREHENSIVE ACHIEVEMENT MONITORING GROUP SUMMARY REPORT*

Rav. Girls' P.E., Psychomotor

<table>
<thead>
<tr>
<th>Student Group 1</th>
<th>All students in the course</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test Administration</td>
</tr>
<tr>
<td>Content Group Summary</td>
<td>1</td>
</tr>
<tr>
<td>Number of students</td>
<td>58</td>
</tr>
<tr>
<td>∅ All objectives <strong>AVG</strong></td>
<td>7</td>
</tr>
<tr>
<td>1 Post objectives AVG ***$$$.</td>
<td>41</td>
</tr>
<tr>
<td>2 Pre objectives AVG</td>
<td>7</td>
</tr>
<tr>
<td>101 Objective 101 AVG</td>
<td>12</td>
</tr>
<tr>
<td>102 Objective 102 AVG</td>
<td>∅</td>
</tr>
<tr>
<td>103 Objective 103 AVG</td>
<td>14</td>
</tr>
<tr>
<td>104 Objective 104 AVG</td>
<td>∅</td>
</tr>
<tr>
<td>105 Objective 105 AVG</td>
<td>$$$</td>
</tr>
<tr>
<td>106 Objective 106 AVG</td>
<td>$$$</td>
</tr>
</tbody>
</table>

*Representative of a partial computer print-out form
**Percentage of objectives/test items performed correctly
***-$$$ indicated no testing of the objective(s) during that test administration period.
AUTOBIOGRAPHICAL STATEMENT
AUTOBIOGRAPHICAL STATEMENT

NAME: Carla Margaret Crippen

BIRTH: December 6, 1936, at Modesto, California, U.S.A.

EDUCATION: Elementary School, Modesto, California; Secondary School, Thomas Downey High School, Modesto, California; Colleges: California State University at San Jose, San Jose, California, A.B., 1958; Stanford University, Stanford, California, M.A., 1960; University of the Pacific, Stockton, California, Ed.D., 1976.


MEMBERSHIPS: Member, Episcopalian Church, Palo Alto, California; American Association for Health, Physical Education and Recreation, California Association for Health, Physical Education and Recreation, California State University at San Jose Alumni, California Teachers' Association, Sequoia District Teachers' Association, and Stanford University Alumni.