

**Fifth Edition**

# **INSTRUCTIONAL STRATEGIES** **for Secondary School Physical Education**



**Joyce M. Harrison**  
**Connie L. Blakemore**  
**Marilyn M. Buck**

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# INSTRUCTIONAL STRATEGIES FOR SECONDARY SCHOOL PHYSICAL EDUCATION

**Joyce M. Harrison**  
*Brigham Young University*

**Connie L. Blakemore**  
*Brigham Young University*

**Marilyn M. Buck**  
*Ball State University*



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## INSTRUCTIONAL STRATEGIES FOR SECONDARY SCHOOL PHYSICAL EDUCATION FIFTH EDITION

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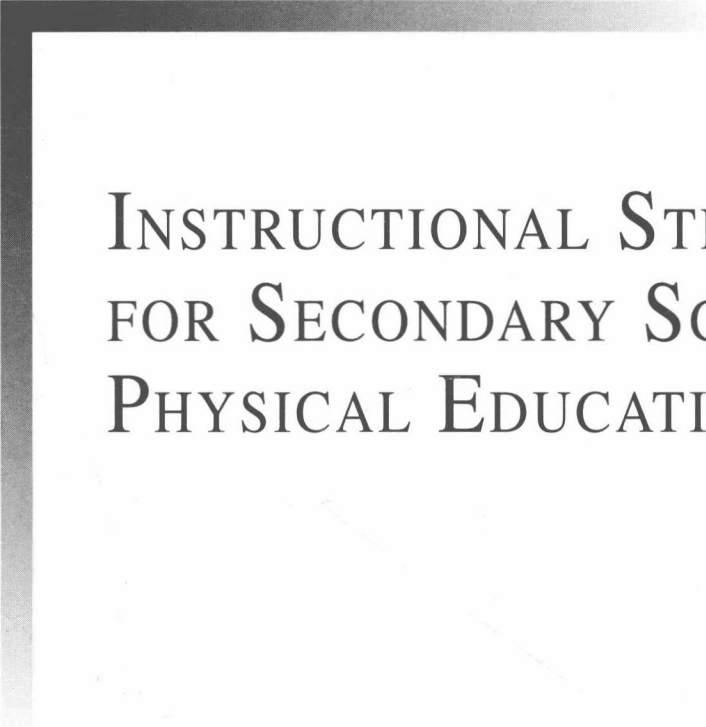
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# INSTRUCTIONAL STRATEGIES FOR SECONDARY SCHOOL PHYSICAL EDUCATION

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# PREFACE

Now in its fifth edition, *Instructional Strategies for Secondary School Physical Education* is comprehensive in nature with a review of various models, which provide an excellent balance between theory and pragmatic teaching strategies. In addition to tying research in education and physical education to curriculum design and instruction, a large number of practical applications and examples are provided.

## WHAT IS THE APPROACH?

The new edition of *Instructional Strategies for Secondary School Physical Education* continues to be closely tied to current research in education and physical education. It is reorganized, with the curriculum chapters appearing early in the text, and each chapter has been updated. A unit approach to organization is used for this text. More information about fitness development, technology, and adventure education has been included.

Unit I—A Framework for Physical Education—reviews material that may have been included in a foundation class and a motor learning class. The purpose of including this information is to include all information needed for effective program development and teaching in one text. This helps the students transfer knowledge gained in other classes to their teaching. Also included in this unit is a chapter discussing liability issues in physical education.

Unit II—Planning the Instructional Program—begins with curriculum planning and then moves to unit and lesson planning. In the fourth edition, curriculum theory and design was placed further back in the book. However, since many beginning teachers are involved in curriculum development, the authors decided to move this material forward since new teachers will integrate the process of curriculum design with that of designing instruction. The curriculum chapters relate specifically to the entry-level teacher and can be taught most effectively by forming curriculum committees of three to five students and actually designing a curriculum. The final chapters in this section discuss specific aspects of unit and lesson planning such as writing objectives, choosing instructional styles and strategies and different program

activities, and assessing student performance. Many practical examples are provided throughout the unit.

Unit III—Organizing and Managing Instruction—discusses classroom management first with the idea that many (if not most) discipline problems can be avoided by the use of proper teaching strategies and classroom management techniques. Proper motivation can also decrease discipline problems. This topic introduces the chapter on motivation and discipline.

The last process in instruction and program design is an evaluation of each. Unit IV—Evaluating Instruction and Programs—discusses the process of evaluating instruction and then the evaluation of the instructional program and suggests how to make the necessary revisions.

## FOR WHOM IS THIS BOOK WRITTEN?

The purpose of this book is to help prospective teachers acquire the skills necessary to design and implement affective instructional programs in secondary school physical education, including middle schools and junior and senior high schools. Successful programs require both effective instruction and a balanced curriculum; together these requirements educate students physically. Therefore, prospective teachers must be instructed in both aspects of the physical education program included in this book—curriculum and instruction.

Although the text is written at an undergraduate level, it can also be used as a resource for graduate students. It is suggested that graduate students form committees and design a resource unit and a school curriculum.

## WHAT ARE THE BOOK'S FEATURES?

### Emphasis on Learning Domains

*Instructional Strategies for Secondary School Physical Education* continues to lead the way in education and physical education by tying together all three of the learning domains—cognitive, psychomotor, and affective—as a basis for the design and implementation of instructional strategies. The emphasis by the American Alliance for Health, Physical Education, Recreation, and

Dance on teaching students the conceptual background of physical education along with teaching physical fitness and skills requires that prospective teachers understand the cognitive and affective domains and strategies for teaching these skills. The development of positive student feelings toward physical education is the key toward continued participation by students in physical education activities outside of school. Teaching traits such as fair play and teamwork are also essential. Therefore, the affective domain should also be studied.

### Pedagogical Features

Although this text is designed to provide the most important and current instructional strategies and research about physical education, the students can easily apply the knowledge directly to them. This process is made with the following helpful features in every chapter:

- *Study stimulators* at the beginning of each chapter are designed to introduce the main ideas of the chapter in a question format.
- A *step-by-step approach* helps students apply what is learned to actual school situations.
- *Review questions* help students apply the concepts learned in the chapter.
- *References* cite the most current resources available.

### WHAT ANCILLARIES ARE AVAILABLE WITH THIS BOOK?

A test bank is available as well as the following online materials to instructors who adopt *Instructional Strategies*

*for Secondary School Physical Education* for their classes. The online material contains a chapter overview, objectives, key terms, discussion questions, class activities for individual and group projects, answers to review questions, sample syllabi/course outlines, sample grading plans, and a downloadable PowerPoint presentation. These online materials have been developed for both students and instructors. These are available on McGraw-Hill's *Human Performance Supersite* at [www.mhhe.com/hper/physed/humanperformance](http://www.mhhe.com/hper/physed/humanperformance).

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U N I T

# I

## A Framework for Physical Education





## 1

THE ROLES OF EDUCATION  
AND PHYSICAL EDUCATION

## STUDY STIMULATORS

1. Is education synonymous with schooling?
2. What similarities and differences exist among the various listings of educational goals?
3. Do educational goals influence changes in the purposes of education?
4. Do you agree with the purposes of education stated in the text?
5. Is there presently a crisis in education?
6. What global changes and trends might impact education? How might education be different in the future?
7. What are the goals or outcomes of physical education?
8. How do the goals of physical education fit with the national goals of education?
9. What are the values of physical education?
10. What is the current status of physical education in the United States?
11. Describe the physical education program of the future.

## WHAT IS EDUCATION?

Have you ever stopped to ponder the question, “What is education?” As a high school or college graduate, do you feel “educated”? Do you think you will ever be truly educated? *Webster’s New Collegiate Dictionary* defines *educate* as “to provide schooling for” and *education* as the “process of imparting knowledge or skill.”<sup>1</sup> Goodlad explains education from a more personal perspective, stating it is the deliberate *cultivation* of desirable traits and sensitivities.<sup>2</sup> He includes socialization as part of education with an encompassing of culture. Gardner discusses the concept of multiple intelligence substantiating eight aptitudes, or intellegences for which we must impart knowledge (see chapter 4).<sup>3</sup> Goleman and others believe that emotional intelligence ought to be a part of the educational mix for our children, linking sentiment, character, and moral instincts. He stresses that the present generation of children is more troubled emotionally than the last: more lonely and depressed, more angry and unruly, more nervous and prone to worry, more impulsive and aggressive.<sup>4</sup> We know that 22 percent of all children born in America are born in poverty, and the suicide rate of children has increased 300 percent in the last thirty years. Further, by age sixteen, the average child will have seen two hundred thousand acts of violence on TV. In 1997, one-third of all male students reported carrying a weapon; in just over ten years, more children have been killed by gunshots than all the U.S. soldiers killed in Vietnam; and America has the highest murder rate in the world—seven times that of Canada and forty times that of Japan.<sup>5</sup>

**REVIEW QUESTION:** How would you define education?

Do you think that education always results from, or even develops most efficiently through, formal schooling? Komoski points out that students spend only 19 percent of their potential learning time in school.<sup>6</sup> Someone once said, "Don't let your schooling interfere with your education." Consider the classroom in which the students were interested in an exhibit of frogs, only to be told, "Come and sit down. We're going to have science now!" Consider, too, the following students, one listening to the driver education teacher talk about how to change a tire when the previous weekend she had rotated all the tires on the family car, or one jogging two laps of the track during physical education class when the night before he had run five miles preparing for an upcoming race.

Aristotle said, "All men by nature desire to know." Coming to "know" might take place in the formal classroom, but just as likely it will transpire in another setting. Historically, education occurred in the home, on the farm, or in the artisan's shop. Even today, much learning occurs on the job, in the home, or by way of the media. *Education is a process of learning, not a place.*

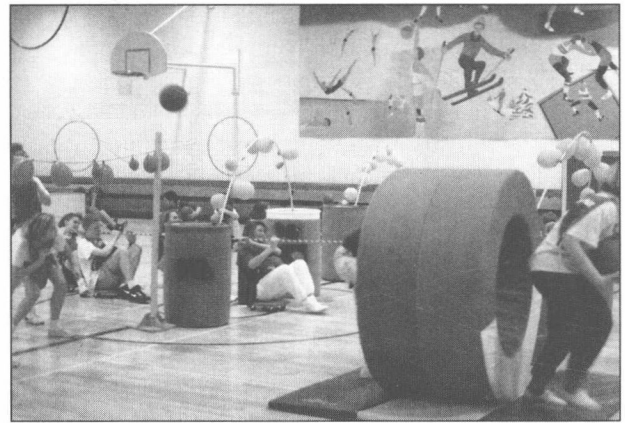
Today's advanced technological society requires continuous learning for effective living and working. Before the turn of the twentieth century, Spencer declared that the function of education is to prepare for complete living.<sup>7</sup> The living process, as characterized by society, is ever changing. The educational process and its purposes must adapt to changes in society in order to prepare citizens to function in an effective way. Teachers play a key role in shaping society as they prepare citizens for complete living. To say that teachers and the education profession have a profound impact on society would be an understatement.

Krajewski and Pettier illustrated how education must adapt its purposes to changes in society with the following story:

This is a story of civilization of some thousands of years ago. The people lived in the warm lands, covered by streams fed by glaciers far to the north. They supported themselves by spearing fish and by trapping tigers.

The glaciers moved south. The lands became cold. The tigers left and sediment from the glaciers choked the rivers. Still, the people remained.

Before the advent of the cold weather the people had prospered and in their prosperity they felt that they should embellish their society and they set up a school system. In that school system, quite logically, they taught the spearing of fish and the trapping of tigers. Then the cold came and the fish left and the tigers left. The people of this area now survived by snaring eel and hunting bear. And they prospered again. They went back to examine their school system. They asked the headmaster what he taught. And he said, "I teach spearing fish and trap-



Physical education is one part of a total educational program and should not be de-emphasized.

ping tigers." And they said, "Well, do you not teach snaring eels and hunting bears?" He said, "Well, of course, if you want a technological education; but for a well-rounded education I prefer the classics."<sup>8</sup>

## THE PURPOSES OF EDUCATION

The educational process reflects what the people in a given society think, feel, believe, and do. Teachers in any setting are given the charge of training, disciplining, developing, and instructing. Teachers working in the formal school atmosphere must take this charge and enhance the purposes of education. In general, the purposes of education in any society include one or more of the following:

1. To preserve and maintain the desirable aspects of the society or culture by transmitting them to the young.
2. To teach the skills and competencies needed to function effectively as an adult member of society, both socially and vocationally.
3. To help the individual act in a responsible manner, both currently and in the future, and function within society so both the individual and the group attain their fullest potential.
4. To teach the individual to think critically, to constructively evaluate societal issues, and to influence the social order by contributing to ordered, purposeful change.

The purposes of education remain constant even though society, in which the educational structure operates, is an institution of change. As change occurs, the educational process adapts to meet the needs of society. Historically, American society has been a world role model, and its purposes of education have been unique in that they are intended to reach out to all Americans.

## THE CURRENT STATUS OF EDUCATION

Throughout the history of American education in the twentieth century, groups were organized with the charge to determine principles or goals for education. Table 1.1 shows a dramatic shift from very open-ended, general guidelines, in the early 1900s to specific benchmarks targeted at improving schools at the turn of the century. Goals 2000 specified all students should have access to physical education and health education to ensure well-being and fitness. The current plea becomes one of excellence in education. The annual Gallup/Phi Delta Kappa polls taken during the early 90s on attitudes toward the public schools revealed a high priority for achieving these goals by the year 2000. However, respondents did not think it was very likely that it would happen, nor did they believe that much progress had been made.<sup>9</sup>

As the century rolled over, these predictions appeared to be mostly true. However, the same poll results at the close of the 1990s found teachers giving the public schools the highest grades ever, with a 69 percent rating of A or B, while the public remained at 49 percent with its ratings of A or B.<sup>10</sup> "The closer people are to the public schools, the better they like them," says the poll.<sup>11</sup>

Conflicting reports exist as to the actual current status of education. Between 1983 and 1985 more than a dozen reports critical of current education practices were printed. One of the first was in 1983 when the National Commission on Excellence in Education issued its report, *A Nation at Risk*.<sup>12</sup> From it came the spine-tingling declaration that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people."<sup>13</sup> Recommendations to correct school shortcomings stemmed from this and other reports. The more important recommendations included the following:

1. The schools must stress science and math and move away from the "frills."
2. The teaching profession must be strengthened by concentrating on the quality, pay, and autonomy of teachers and bolstering teacher-education programs.
3. The school curriculum should be more related to the job market and to perceived needs of industry (including computer literacy).
4. Foreign-language instruction ought to start in the elementary schools and should generally receive a high priority.
5. Students should spend more time in school, and their time should be used more effectively for instructional purposes.<sup>14</sup>

The 1990s began with a heightened public concern for education, including backing for a standardized national curriculum, upgraded educational outcomes, and

support to increase taxes.<sup>15</sup> The first presidential State of the Union address of the decade highlighted societal ills affecting the educational process. Illiteracy, school dropouts, and drugs were targeted as national priorities.

On the other hand, the Sandia Report, which was commissioned by the U.S. Department of Energy, contradicts the results of the previous reports. This report, never allowed to be published, although it is supported by the research of others, stated that the schools are doing as well now as they ever have.<sup>16</sup> This is especially amazing "given the severe decline in other social institutions."

A middle-of-the-road posture has been taken by some who believe the crisis has been manufactured by government, business, and the press to divert attention away from the real problems in education. Some issues of student achievement, funding, production of scholars, teacher training, decreasing of moral values, unhappy citizens, and private schools have resulted in myths that must be viewed from all angles to achieve a proper perspective.<sup>17</sup>

Bracey acknowledged that the schools have problems that need to be resolved. The schools most in need of help are the rural schools in low-income areas.

Chase, president of NEA, emphasized fifteen years later that we are still a nation at risk, "yet to get serious about its schools."<sup>18</sup> He states loose academic standards allow half of all twelfth graders to take no science courses, and one out of three take no math. Low salaries fail to lure enough qualified teachers, with 28 percent of high school math teachers and 55 percent of physics teachers having neither a college major nor minor in their subject. He called for higher standards in U.S. public education with a revolution focusing on rigorous curriculum requirements, smaller class sizes, better teacher training, and an end to social promotion.

Such a revolution already sees the schools bathed in technology and teaching to *outcomes* in all disciplines. Mohnsen emphasizes "we must move all aspects of education, including physical education, into the information age."<sup>19</sup> However, the advantages of the information age will pass students by if our schools are an unsafe place. With guns and drugs being an issue of the 90s, students are losing their lives due to incidents at schools. In 1995 the U.S. Department of Education announced the results of surveys indicating that a large number of schools are plagued with violence, the availability of drugs and alcohol at or near school, and the lack of discipline.<sup>20</sup> The National Education Goals dealing with these issues, must be taken seriously with plans to attack these problems, thus perpetuating in the schools basic American values. These are not problems the schools can solve by themselves.

Students need to come to school desiring to learn and possessing a readiness to do so, and schools will have to provide a conducive atmosphere. Students who come to school *prepared to learn* do well.<sup>21</sup> Lawson



**TABLE 1.1** A Perspective of the National Goals of Education

Cardinal Principles [1918]	Educational Policies Commission [1938–44]	Imperatives of Education [1964]	National Goals [1973]
	<b>AIMS</b> Self-realization Human relationship Economic efficiency Civic responsibility <b>TEN IMPERATIVE NEEDS OF YOUTH</b>		
Health (physical fitness)	Good health and physical fitness	Deal constructively with psychological tensions	Adjustment to change (mental health) Communication skills
Command of fundamental processes	Think rationally, express thoughts clearly, read and listen with understanding		
Vocation	Develop salable skills	Prepare for world of work	Computation skills
Civic education	Understand the rights and duties of a citizen. Develop respect for others, live and work cooperatively with others	Keep democracy working  Work with other peoples of the world for human betterment	Critical thinking  Occupational competence
Worthy home membership	Understand the significance of the family		Responsibility for citizenship
Worthy use of leisure	Use leisure time well	Make the best use of leisure time	*Respect for law and authority
Ethical character	Develop ethical values and principles Know how to purchase and use goods and services intelligently Develop capacities and appreciate beauty in literature, art, music, and nature Understand the influences of science on human life	Strengthen the moral fabric of society Make intelligent use of natural resources Discover and nurture creative talent Make urban life rewarding and satisfying	*Appreciation of others *Clarification of values Clear perception of nature and environment Economic understanding *Appreciation of the achievements of individuals *Knowledge of self

**TABLE 1.1** Continued

Seven New Cardinal Principles [1978]	Four Essential Goals for High Schools [1983]	National Education Goals [1990] By the year 2000:	Call to Action: Pres. Clinton Education in 21st Century
			Incorporate rigorous national tests in 4th grade reading and 8th grade math.
Personal competence and development	Develop critical thinking		Provide a talented and dedicated teacher in every classroom.
Skilled decision making	Prepare students for further education	<i>Preschool programs:</i> nutrition and health care, parental training	Insure every student reads independently and well by the end of 3rd grade.
	Increase students' career options	<i>Student testing:</i> national tests in grades 4, 8, 12	Expand Head Start and encourage early parental involvement.
Civic interest and participation	Build a spirit of community service	<i>Student performance:</i> students test first internationally in math and science	Expand educational choice and accountability.
Global human concern		<i>High school graduation rates:</i> rise to 90 percent	Provide safe, disciplined, drug-free schools.
Family cohesiveness			Modernize school buildings.
Moral responsibility and ethical action			Make 13th and 14th years of education as universal as high school.
Respect for the environment		<i>Literacy:</i> every adult skilled and literate	Offer adult education through simple skill grants.
		<i>Schools:</i> all safe and drug-free	Connect every classroom and library to the Internet, encouraging students in technology literacy.

\* Process goals

Additional information pertaining to the president's Call to Action is available on the World Wide Web at <[http://www.gov/updates/ PresEDPlan/](http://www.gov/updates/PresEDPlan/)>.

stated, "Schools cannot achieve their assigned goals if children and youth do not come to school ready and able to learn. . . . Only rarely do ['at-risk' children] come to school healthy, ready, and able to learn. All too frequently, they are hungry, need rest, and are seeking adult guidance and support. Today's schools cannot be expected to work for these young persons.<sup>22</sup> Herein lies the challenge for education in the future.

**REVIEW QUESTIONS:** What do you believe are the issues facing the schools today?

What solutions would you propose for those issues that are problematic?

## THE FUTURE OF EDUCATION

The purposes of education in the future will be the same as the four purposes of education listed above. How those purposes are achieved will dramatically change to meet the needs of a changing society. Jensen points out the changes that are happening in America, such as availability of information because of technological transformation, social ills (disintegration of families, drug problems, high school dropout rates, unskilled labor force, gangs), medical advances, ethical issues (loss of faith in government), environmental issues, and a transforming educational system.<sup>23</sup> A graduate today would fit into the following international picture: in a village of 1,000 people, 564 would be Asians, 210 Europeans, 86 Africans, 80 South Americans, and 60 North Americans. Five hundred ten would be female and 490 would be male. Eight hundred would live in substandard housing, 700 would be unable to read, 500 would suffer from malnutrition, 700 would be nonwhite, and 300 would be white. Only 10 would have a college education, with 50 percent of the wealth being in the hands of 60 people (most of these being U.S. citizens). In this village, 300 would be Christian, 180 Muslim, 130 Hindu, and the rest atheists, with no knowledge of any religion.<sup>24</sup> The United States is a melting pot, and these demographics should be considered by educators today.

Schools are changing, in everything from how classes are scheduled to who makes decisions. How many of the following twelve issues facing public education today would you put on your list?

### High Technology and Moving Into the Information Age (Including Brain Research)

In the first decade of the twenty-first century, a third of the world's population will be linked by computers that will be even more compact. Nearly two billion people can click a button to connect with other educators and integrate information and programs.<sup>25</sup> The Internet has virtually brought bookstores, libraries, and video cables into the school setting, and schools need to do all they can to capitalize on technology. Distance learning is an-

other viable option. Colleges and universities are now able to pipe courses into high schools, even across oceans. However, students are often more technology literate than their teachers. Teachers need to be able to take advantage of this vast arena of technology. Many teachers have computers on their desks making materials accessible to help with such everyday tasks as attendance. Heart monitors and other technology are becoming common place in physical education programs. Each physical education teacher must be technology literate, and ask "How can this information age and new technology improve my program?"

The information age includes an emphasis on emerging brain research. "We are learning about the brain at an unprecedented rate," says Jensen.<sup>26</sup> Technology has paved the way with brain scanners like Magnetic Resonance Imaging (MRI) and Positron Emission Tomography (PET). We can better understand and see inside the brain. Jensen notes, "We are on the verge of a revolution: the application of important new brain research to teaching and learning. This revolution will change school start times, discipline policies, assessment methods, teaching strategies, budget priorities, classroom environments, use of technology, and even the way we think of the arts and physical education."<sup>27</sup> Teachers today will be much more effective if they keep up on the latest brain research information, realizing that information over three years old is most likely out-of-date. Entire text books have been written on this subject. Included here are several findings especially pertinent to teachers of the new century.

### *Emotions Activate the Brain*

While our emotional system is acting independently, it is also acting cooperatively with the cortex of the brain. Teachers need to be especially cognizant of fear, threat, and stress. Research has shown that under threats, anxiety, negative stress and induced learner helplessness, the brain operates differently. There is an altered blood flow and electrical activity pattern in the brain, minimizing its potential. It is less capable of planning, judging problem solving, and other higher-order skills. Actions by the teacher or peers that lead to embarrassment or humiliation are damaging to the learning process. Threatening comments, score-keeping discipline strategies, sarcasm, unannounced pop quizzes, unforgiving deadlines, and cultural or language barriers are other forms of threat and stress.<sup>28</sup> To increase productivity and learning in the schools, both teachers and students would do well to practice anger-management techniques and preventative programs.<sup>29</sup>

### *Motivation Calls for Stimulation and Novelty*

Students may be temporarily unmotivated due to associations from the past, which when triggered, provoke a negative or apathetic state. For example, a teacher's



voice, tone, or gestures may remind a student of a previous, disliked teacher. In addition, students not taught in accordance with their learning style may react with a lack of motivation. To determine how each individual student best learns, teachers may want to retrieve learning-style information from such sources as Rita and Kenneth Dunn's Profile, Ned Herrmann's Brain Dominance model, the Gregorc/Butler model, Meyers-Briggs,<sup>30</sup> or Kolb's Cycle of Learning.<sup>31</sup> Finally, a clear picture of well-defined goals and a perception that "I can succeed," aids motivation.<sup>32</sup>

Recent research caused teachers to re-think external rewards. Such things as candy, trophies, and certificates appeal to each student in a different way. They may actually be a source of lack of motivation for some students. Teachers should strive to reach the internal hypothalamic reward system of the brain. Pleasure-producing behaviors such as affection, entertainment, caring, or achievement will do this.<sup>33</sup>

"Choice remains critical to maintaining motivation," says Jensen.<sup>34</sup> When participants are given control over the content and process of their learning, motivation goes up. They need to make choices about personally relevant aspects of a learning activity. When given choices, burnout is reduced, discipline problems decrease, and achievement motivation increases.

### Enrichment

Jensen emphasizes that challenge + feedback = brain enrichment.<sup>35</sup> Too much or too little challenge will cause students to give up or get bored. Mental challenge can come about with new material; adding degree of difficulty; varying time, materials, expectations, support; novelty; and change in room decor or strategies. Chen and Darst have shown that students' low motivation in learning physical skills is attributable to the lack of interesting learning tasks. They suggest teachers should use tasks that facilitate exploration in learning and emphasize enjoyment, rather than excessive challenge. They also suggest that novelty in an activity can be easily interpreted by students as challenge. Also keep in mind, "without our magnificent system of feedback, we would be unable to learn."<sup>36</sup> Feedback must be specific, not general. It is ordinarily most useful when immediate, although a stressed or threatened learner may prefer delayed. Group interaction provides effective feedback. Most teachers should be using much more appropriate feedback, perhaps twenty times more.

### Brain Rhythms

Researchers have found that the best time for short-term memory activities, rote learning, problem solving, test review, math, and science is between 9 A.M. and 12 noon. On the other hand, the best time for movement-oriented tasks, computer work, singing, and art are after noon. The best time for doing sports, music, theater, and man-

ual dexterity tasks are between 2 P.M. and 5 P.M.<sup>37</sup> This means we should be starting school later, especially for teenagers (no earlier than 8:30 A.M. and preferably 9:00 A.M.). Recent research suggests that teen biorhythms are different from the average adult. Teenagers need more sleep than children and adults. They need to begin that sleep later at night, and sleep later in the morning. Sluggishness during the first two periods of the day may be due to sleep deprivation. Edina High School in Edina, Minnesota, starts school at 8:30 A.M. and this experiment is proving to be a "phenomenal" success.<sup>38</sup>

### Gender Differences

There has been considerable discussion over brain differences between boys and girls that may affect their learning. Research tells us that women are better learners the two weeks after their menstrual period is over.<sup>39</sup> We know that females do better at mathematical calculation, while males do better at mathematical reasoning. However, researchers are now finding that boys are not outperforming girls on national tests, and that the gender gap all but disappears with time and experience.<sup>40</sup> Researchers have documented differences in growth patterns, brain-structural differences, hearing, vision, touch, activity patterns, smell, and taste. Females usually learn to speak sooner and begin puberty changes sooner. Males have better distance vision and depth perception than females. Females excel at peripheral vision. Females have a more diffused and sensitive sense of touch as well as a stronger sense of smell. These differences are good to be aware of, but may not significantly affect the learning environment. The culture often perpetuates differences that have nothing to do with genes, such as that girls aren't good at math or science. Often girls' academic confidence and grades start to slump just at the time their bodies develop, their periods begin, and their self-confidence grows shaky.<sup>41</sup> Effective teachers strive to maximize the potential of each student, no matter what the gender.

### Rehearsal Time

Teachers must capitalize on the brain's ability to rehearse. Repeating information is helpful when done with the brain in mind. Those items most recently taught are remembered better. However, when items are also presented at a slower rate, subjects remember not only the last items on the list, but the first ones as well. When presenting refinement cues, they should be given one at a time and repeated often. A fewer number of cues has a greater possibility of being remembered because students remember the first and the last, tending to forget the middle. The most important information should go at the beginning and the end taking into account *recency* and *primacy* effects. These effects play on the short-term memory, and it is suggested constant repetition moves simple information to long-term memory. More