

On Styles

Michael W. Metzler

The Spectrum of Styles developed by Musska Mosston is one of the most, if not the most, widespread conceptualizations of teaching in physical education today. The publication of his newest work might serve to further increase the Spectrum's use in our teacher education programs and teaching practices. This essay examines what the Spectrum has provided as a set of paradigms for teaching and analyzes some of its limitations. The central thesis of this paper is that many of the concepts, implications, and assumptions set forth in the Spectrum have never been validated as appropriate instructional approaches. Second, the concept of teaching "styles" with a teacher-centered focus is contested, alternatively favoring an instructional decision making process that stems directly from the immediate needs of the learners. The final section suggests reconceptualizing the several styles of the Spectrum as micro strategies with a limited scope in order to better the expectations for meeting stated instructional goals.

*Well, here I go again, building castles in
the sand,
Saying this is real essential, this is where
it's at.
You know, I couldn't understand
This is how it really is.
Why am I surprised when the tide rolls in?
-Dire Straits, "Solid Rock"*

Undoubtedly, the strongest influence on the way we conceptualize teaching in physical education today is *The Spectrum of Teaching Styles* developed by Musska Mosston (1966). References to

The author would like to thank Anthony Annarino and Thomas Templin for their helpful review of an earlier draft of this manuscript. No portion of this paper is to be duplicated without the expressed permission of the publisher and/or author.

About the Author

Michael W. Metzler is an assistant professor in the Division of Health, Physical Education and Recreation at Virginia Polytechnic Institute and State University in Blacksburg.

teaching styles, presumably a result of this influence, are commonly found in teaching methods texts (Dauer & Pan-grazi, 1983; Dougherty & Bonanno, 1979; Figley, Mitchell, & Wright, 1977; Melograno, 1979; Siedentop, 1983). If other topical literature is an accurate indication (Pease, 1982; Rupnow, 1982), it is possible that this series of teaching models will have an even stronger influence with the publication of the latest edition of this work (Mosston, 1981). One can easily suggest that almost no undergraduate major in a certification tract, no graduate student in pedagogy, and no teacher educator is not at least familiar with the Spectrum, and many may use the concepts and models within it. Mosston's work seems to be the most pervasive in our field.

This obvious stronghold of support for the Spectrum may explain why no critical analysis of it has been undertaken—so many people use it that the inherent concepts, assumptions, and implications are accepted as dogma. Such easy acceptance not only facilitates the

implementation of the Spectrum, but it also tends to proliferate the Spectrum's use from generation to generation of teachers through teacher education programs. On the other hand, our receptivity might tend to blind us from seeing some of the serious limitations of the Spectrum as *the* collective paradigms for teaching. After over 15 years of the Spectrum, it seems to be well past the time for a critical look at just what the Spectrum is as a set of teaching models for physical education.

This analysis is not meant to be another in the long line of descriptions about what the Spectrum is and how its several component styles are designed. Rather, it examines just what the Spectrum has done as the most influential force in our ideas about teaching. The immediate question here is whether the Spectrum of Styles has actually contributed in a positive way to our understanding of teaching and in the development of more effective instructional models for our subject matter. The focus of this essay is not only on the Spectrum itself but also on the concept of teaching "styles"—that process of determining patterns for classroom behavior primarily by what the *teacher* does and assuming that these behaviors will then result in a certain set of desired student behaviors.

What the Spectrum of Styles Has Given Us

A Set of Teaching Models

In a profession that has a pronounced lack of viable teaching models (Metzler, 1982) the newest Spectrum contains eight models upon which teachers can depend for instructional decision and behavior referents. These are true *teaching* models—ones that have been designed for teachers to implement in their day-to-day efforts to facilitate student

learning. These models can be used to meet a variety of teaching goals spread across all domains of learning. There is no equivalent to this sequence of teaching models in our field. Mosston has provided us with multiple models whose diversity allows us to address a plethora of instructional needs across the entire range of activities we teach.

A Widely Accepted and Understood Language

Because of its extensive use in our teacher education programs and teaching practices, the Spectrum has generated a common jargon for us to use when talking about teaching. Each of the different styles has become commonly known as a frame of reference. Quite often we say that a teacher is using a certain style at a given moment, or that a certain teaching pattern is "similar to the _____ style of Mosston's." It then enables us to converse about teaching in a clear, efficient manner and to claim this jargon as our own—different from other teaching fields.

This jargon also encourages clear dialogue at all levels of the study of teaching in our field. Undergraduates learn the names and components of the styles and can then communicate well with other teachers, regardless of experience and preference of styles.

Not only has the Spectrum produced a uniquely referential language, it has also clarified other dimensions of the teaching process, especially those of "direct" and "indirect" methodologies. These describe class decision allocations as either teacher-centered or student-centered. Consequently, just as we can talk about how a certain technique relates to a given style, now we can use this common language to place that particular style of teaching pattern on a continuum of directness-to-indirectness without causing misunderstanding by others.

A Model for Decision Making

The foundation of the entire Spectrum of Styles is decision making (Mosston, 1981). In reality, teachers make all of the decisions because they make the keystone decision about "Who decides what." However, part of that process is to determine how many and what kinds of decisions will be granted to the students. How many decisions and the nature of those decisions given to students not only determines what style is used but also where that style falls on the direct-indirect continuum. Mosston identifies 25 sets of decisions across three instructional phases. Quite simply, the more of these decisions given to students the more each style progresses from Command to Going Beyond, or, from direct to indirect.

This delineation of decision making is an invaluable aid to teachers in selecting a style and in determining how well they implement it. Making decisions means weighing instructional alternatives and then selecting a course of action. It requires teachers to think before they act and then gives them a blueprint to follow in their teaching behavior. This emphasis on teacher decision making is a great step forward in a field where such decision making is often sorely lacking or poorly done.

At another level, Mosston's decision making outline is basic for instructional analysis, diagnosis, and prescription. If the original instructional intent is known, it is much easier to locate sources of teaching deficiencies and make recommendations to eliminate them. On the positive side, such a decision/analysis approach is an efficient way to identify and reinforce desired teaching behaviors when they happen.

One of the newest conceptualizations of the study of teaching is the analysis of *how*, and how well, teachers make decisions. Seemingly contrary to Michael Sherman's position that the study of

teacher decision making in physical education is 10 years away (Sherman, Note 1), we have been using teacher decision making analyses through the Spectrum for some time now. We have just not done so in the more formal sense of empirical study.

Though many proponents of the Spectrum would not admit it, the decision-based foundation of the Spectrum allows us to perform a sequential systems-like analysis of teacher decision making and resulting instructional behavior (Siedentop, 1983). A systems model first identifies a set of goals and potential pathways for meeting those goals. From this set a teacher initially decides what the instructional needs are (in most styles) and then makes decisions about how best to meet those needs. Those decisions are then translated into a pattern of teaching behavior and implemented with students. Once implemented, the selected set of decisions then becomes one criterion for assessing effectiveness of both decisions and actions. Effectiveness is always assessed in terms of stated goals. This results in some degree of modification, followed by another phase of implementation, and so on.

A Potential for Conducting Research on Teaching

With eight different models, 25 sets of teacher and student decision making categories, and unlimited process variables, the Spectrum of Styles offers a mind-boggling menu for doing research on teaching in physical education. Add to that list Mosston's own assumption that progression along the direct-indirect continuum fosters learning in the four Developmental Channels (Physical, Social, Emotional, and Cognitive), and one becomes awed by the amount and importance of empirical questions that might be generated through the Spectrum.

Unfortunately, all of this has to be spoken of as a *potential* for research. The amount of research conducted on the Spectrum to date has been scant in comparison to what is proffered by it. In addition, for reasons to be discussed in detail below, almost every study completed in this vein, when viewed in the light of current state-of-the-art technologies for studying teaching and learning in naturalistic settings, is subject to serious limitations.

Problems with the Spectrum

Overemphasis on Teacher Behavior

As one understands more about the Spectrum of Styles and carefully listens to proponents talk about the Spectrum, he/she soon realizes that Mosston has placed the teacher at center stage in all of his models, despite the fact that teachers relinquish more and more decision making responsibility across the continuum of styles. The focus of the Spectrum is always on the teacher, and indeed each style is defined and explained first in terms of what the teacher does. Mosston acknowledges this priority:

It is the teacher, then, who is in focus. The teacher is the initiator, not the curriculum nor the learner. When a teacher faces a class of students, it is the teacher who has to answer the question, "How do I teach?" It is the teacher who has to know how to initiate contact with the student; it is the teacher who has to know how to take charge and create a climate conducive to learning and social interaction. The teacher is the orchestrator of the classroom environment. (1981, p. 3)

It seems that the real issue in determining teaching behavior has escaped Mosston, namely that the teacher's orchestrations extend from another source—the students' needs as they pursue the learning of the subject matter. All in-

structional decisions must originate at this source rather than with the teacher. Surely the teacher is the one who puts all of the pieces of this puzzle together, but the pieces are *given* to the teacher in the form of instructional needs and variables generated by learners and the instructional setting. Mosston does discuss the needs of the learner in this chain of events, but his treatise is superficial and his commitment to the learner's needs fleeting. He always retains his teacher-centered focus, despite allowing for increased student decision making across the Spectrum.

This teacher focus has a serious side effect. As styles are defined by teacher behavior, we are diverted from attending to student process behavior—a better measure for assessing instructional effectiveness. Mosston implies that *teacher behavior* causes student learning, when in fact *student behavior* causes student learning. Teacher behavior only mediates, or facilitates, this process (Berliner, 1979). This point of view considers the teacher as another *part*, albeit an important part, of the instructional environment. To use Mosston's analogy correctly then, a conductor does not *cause* music to be played but rather *facilitates* better harmony between the members of the orchestra and the written music. So it is with teaching.

The implications of this teacher focus seem clear: The more teachers try to orchestrate, vis-a-vis the different styles of the Spectrum, the harder it is for them to view themselves as a part of the learners' environment, prolonging a blindness to the central issue at hand. Stated another way, what *students do in class* makes the biggest difference in their opportunity to learn a subject.

Lack of Student Process Descriptions

A result of this primary focus on teacher behavior is a lack of knowledge

about student behavior. It is not possible to correctly ascertain the exact student process behaviors within and between styles while looking at teachers only. Mosston makes contentions about what the students are supposed to be doing within each style, but these descriptions are vague. For the most part, student behavior within each style is implied by Mosston and presumed by teachers to be happening as they implement a style.

From a student process perspective, in the view of the Spectrum, it is not possible to determine differences between such important instructional facets as content focus, engagement rate, and academic learning time accrual. It is likely that the Command and Reciprocal styles will produce equivalent amounts of these process variables for students while teacher behavior in each style looks quite different! Where, then, is the effective difference in terms of student learning processes? This point of contention does not ignore the newer Non-versus concept of the Spectrum (Mosston, 1981). Rather, it raises a question about the need for any differentiation at all if such style differences in fact result in no real student learning process differences.

It is also possible that teaching behavior in the same style can result in contrasting student process behavior. Recent studies with Experimental Teaching Units in physical education (Keller, 1982; Young, 1981; Young & Metzler, Note 2; Metzler & Young, Note 3; Metzler, Note 4) have shown that some students can have five times more engagement and academic learning time as other students under teaching behavior in the same style (Practice, in these studies). Following an assumption that student behavior, rather than teacher behavior within a selected style, is the best measure of teaching process effectiveness, one could easily argue that style delineations are not nearly as important

in the teaching/learning enterprise as Mosston and his proponents suggest.

Verification of Styles

Since its introduction, one of the major problems with the Spectrum has been the difficulty in determining the degree to which a teacher is faithfully implementing an intended style. Mosston points out that each style contains features of adjacent styles on the continuum. The sequential nature of the Spectrum necessitates this. However, this overlap sometimes makes it difficult to determine in practice where one style ends and another begins. When does an observer (or teacher) make the decision about which style is being used? For example, during a tennis class a teacher begins by calling roll with students in squads (Command). This is followed by an instructional period in which some students stay with the teacher for a lecture/demonstration on forehand (Command), while others go to another part of the courts and hit against the backboard (Practice). When the teacher finishes the lecture, he/she goes to the group on the backboard. One student is practicing backhands and is hitting shots with too much backspin on them. The teacher asks, "Why is that happening?" (Divergent, among others). The rest of the students are still hitting against the wall (Practice), while the student with the teacher makes several slow motion shots and focuses on the head of the racket. After some time he/she responds, "Because I am turning my wrist under and not keeping a flat racquet head" (Problem Solving).

If this scenario is played out for the rest of the class period it is quite likely that the teacher would use even more styles, each in varying degrees. What then determines the overall description of this teacher's behavior according to the Spectrum? Is it the style of the mo-

ment, the one used most often, or the one used for the longest time? More importantly, with what style has each of the students been taught? Quite likely each student has received instruction under a different variety of styles than his/her cohorts.

Because it is difficult to verify styles, it can then be difficult to demonstrate the differences between styles to preservice teachers. In another version of the problem it is then difficult to teach them "pure" styles—those in which the behavior patterns of a particular style are easily discernable from other styles and then correctly enacted. The inability to easily verify styles is a central problem with the Spectrum, especially with the pervasive use of it in teacher education. Preservice teachers will likely not be able to demonstrate the inclusive behaviors for each style because of the necessary overlap between adjacent styles on the continuum.

Problems With Research on the Spectrum

There are three main problems with research on the Spectrum: the real scarcity of empirical data we possess, the methodologies used to collect data that do exist, and an inability to isolate variables (dependent and independent) to better understand the real effects of the various styles on student learning.

With all of the promise and potential of the Spectrum as a source of empirical study on teaching in physical education, few researchers could argue that the potential has even come close to being fulfilled. Despite its widespread use in our teacher education programs and in our pedagogical practices, there is little hard evidence from which to proceed for implementing the styles of the Spectrum. If an outside observer were to examine our literature and teacher education programs, he/she might easily but incorrect-

ly assume that we have investigated all the claims and verified all the stated implications in each of the Spectrum styles (Mosston, 1981). In fact, however, we have not. Several critical questions have not been answered, and many of them have not even been addressed. What, for example, is the relationship between teacher behavior in each style and student achievement, however defined? When teachers change from one style to another, what does this mean for student behavior and achievement? Does the progression from Command to Discovery really promote learning in the four developmental tracts? Can undergraduates effectively discriminate between behaviors across styles and convert those discriminations into actual behavior? Is the Reciprocal style a more effective way to increase skill attempt feedback? What kinds of question-asking and verbal behaviors are needed to effectively teach the Guided Discovery Style? This list can go on and on.

Every one of the implications under each style in Mosston's book (1981) is a stimulus for many as yet unanswered questions. The longer they go unattended the more one must sincerely question the real basis upon which the Spectrum is used. For example, the existing evidence does not lend any support to the common assumption that moving along the Spectrum's continuum increases learning in the four developmental tracts (Boschee, 1972; Jacoby, 1975). Relying so heavily on the styles of the Spectrum in every aspect of our teaching without these answers makes the ground underneath our practices very shaky indeed.

The second problem with research on teaching in the Spectrum, though different in nature, is certainly no less a concern. Spectrum studies in general have tried to ascertain if student learning and/or attitudes change across styles or with the implementation of just one

style. The basic methodologies for answering these questions are remarkably similar. Style A and Style B are presented to different students as the independent variable(s). The dependent variable is some measure of learning performance and/or affective change. Each style is taught to a designated group over a period of time. Statistical treatments are then applied to determine if significant changes did in fact occur in the dependent variable. Any observed statistically significant changes are then attributed to differences in the two contrasting styles, or in some cases differences between one style and no instructional treatment (a control) (Boschee, 1972; Dougherty, 1970; Gerney, 1979; Griffey, 1983; Jacoby, 1975; Johnson, 1982; Mariani, 1970; Schlott, 1970; Virgilio, 1979).

As a group these studies suffer from serious methodological deficiencies, specifically the near absence of any process measures for student and teacher behavior. Except for a limited use of verbal behavior interaction analysis, "eyeballing" was the only independent variable reliability technique used to monitor teacher behavior consistency across time, while student process behavior was typically and intentionally ignored altogether. In a word, these are classic "blackbox" studies of teaching (Dunkin & Biddle, 1974; Graham, 1981; Locke, 1977). Without exact observations of process behaviors, there is nothing we can say about why (if at all) the independent variables in these studies resulted in changes in the dependent variables.

This failure to attend to teacher and student process measures leads to the third problem with research on the Spectrum—the inability to isolate relevant variables contributing to or promoting changes in other variables over time as a result of the stated experimental treatment strategies. Part of this problem is not knowing exactly what goes on with

teachers and students within a style. Another part is not being able to account for the differences between styles, given the admitted overlap in them. In these studies two different styles and their effects on students are assumed to be largely exclusive of one another, when such exclusivity is not demonstrated by researchers for either cause or effect. Consequently, then, vaguely conceived independent variables are being applied to vaguely conceived independent variables.

As the findings from these studies are examined, they are characterized by a consensus of "no significant differences" between contrasting styles. Part of this string of NSDs must be attributable to the nearly complete vacuum of information about process behaviors. Investigators seem stymied when they contribute to this growing consensus and posit that there might not be differences between styles on learning and/or attitudes. This assumption might be true, but it cannot be ascertained until studies like these include descriptions of process behaviors in them. Only recently has this shortcoming been acknowledged within this avenue of research (Griffey, 1983).

The final analysis of research on teaching using the Spectrum leads to two unavoidable conclusions. First, for all we say we know about it, we have very little empirical evidence to justify its prolific use in our programs. Second, the evidence that does exist has to be suspect and the real reasons why certain changes occur (or don't occur, mostly) under contrasting styles are as yet unknown. On balance, it would appear that the Spectrum and teacher-based styles cannot be justified as the most prominent conceptualization of how to teach physical education. Empirical support and sound rationale for the widespread use of Mosston's concepts, assumptions, implications, and consequently his several teaching paradigms,

are still lacking. However, this does not mean we should abandon the Spectrum—it has and can continue to contribute to our efforts to teach motor play skills and attitudes in our programs. Rather, we should find ways to parcel out the best features of the various styles and reimplement these teaching models under a new light. One suggestion for doing just that is given below.

Strategies, not Styles

In order for the several styles in the Spectrum to be more flexible and attentive to changing instructional needs, they require reconception. In their current form they are quite unwieldy for users because they are too encompassing in scope. They are “macro” approaches to teaching (Griffey, 1981) that include too many general decision and behavior guidelines. These general guidelines cannot be applicable during every moment of teaching even one class, thus necessitating frequent changes of style during instructional periods. This often causes a conflict between immediate instructional needs and the recommended behavior patterns within a style. Unfortunately, the usual resolution is to make the moment fit the style and not the other way around.

Such problems could be minimized with a switch to “micro” strategies—those that are designed to address small, specific instructional situations. These situations could be in the form of stated instructional goals, desired student individualization, time, content, or myriad teacher behaviors. Whatever the form, the instructional situation and resulting strategy can then be defined in terms of the student at any given moment. Teachers would not be preoccupied with teaching to a style, but with determining what needs each student has and selecting a strategy to meet those needs, regardless

of how often behavior changes are required.

A change from macro styles to micro strategies would require a major shift in how styles of teaching are presently viewed. Each of the Spectrum styles could be included in a set of identified strategies, designed to be implemented under certain instructional situations. For instance, the Reciprocal style might be reborn as a strategy for increasing student interaction and as a strategy for increasing verbal feedback during practice time. It would then be a highly useful strategy to include on a list of what teachers can do to increase interaction and/or feedback when these are the momentary instructional goals. Another example would be to include the Practice style within a repertoire of strategies for facilitating individualized skill instruction in large classes, or as a way of presenting multiple learning environments within a single class. Each style has the ability to address a variety of situations and would then be included under many such lists. Reconceived in this manner, each style-turned-micro strategy would lend itself much better to incorporation during instruction and to empirical questions about its effectiveness.

This reconceptualization of the styles of the Spectrum as micro strategies would increase each style's effectiveness in the teaching/learning process by limiting its scope and better matching expectations with abilities to resolve instructional problems. It is also likely that such redefining would then warrant the widespread use of these paradigms in our teaching and teacher education programs. As with any instructional model, when each style's potential is matched with proven practices in the teaching of our subject matter, collectively they will then be able to fulfill the promises we have so easily made for them.

REFERENCE NOTES

1. Sherman, M.A. *Covert operations in physical education: Exploring the teacher's mind*. Paper presented at the AAHPERD National Convention, Houston, April 1982.
2. Young, J., & Metzler, M. *Correlations between ALT-PE and student achievement in a novel skill experimental teaching unit*. Paper presented at the AAHPERD National Convention, Houston, April 1982.
3. Metzler, M., & Young, J. *The relationship between teachers' preactive planning and student process behavior*. Unpublished manuscript, 1983.
4. Metzler, M. *Using academic learning time in process-product studies with experimental teaching units*. Paper presented at the CIC Big Ten Symposium on Teaching Research in Physical Education, Purdue University, November 1982.

REFERENCES

- BERLINER, D.C. Tempus educare. In P. Peterson & H. Walberg (Eds.), *Research on teaching: Concepts, findings and implications*. Berkeley, CA: McCutchan, 1979.
- BOSCHEE, F.A. A comparison of the effects of command, task and individual program styles of teaching on four developmental channels (Doctoral dissertation, University of Montana, 1972). Ann Arbor, MI, University Microfilms No. 72-29,343.
- DAUER, V., & Pangrazi, R. *Dynamic physical education for elementary school children* (7th ed.). Minneapolis: Burgess, 1983.
- DOUGHERTY, N. A comparison of the effects of command, task and individual program styles of teaching in the development of physical fitness and motor skills (Doctoral dissertation, Temple University, 1970). Ann Arbor, MI, University Microfilms No. 71-10,813.
- DOUGHERTY, N., & Bonanno, D. *Contemporary approaches to the teaching of physical education*. Minneapolis: Burgess, 1979.
- DUNKIN, M., & Biddle, B. *The study of teaching*. New York: Holt, Rinehart & Winston, 1974.
- FIGLEY, G., Mitchell, H., & Wright, B. *Elementary school physical education: An educational experience*. Dubuque, IA: Kendhall/Hunt, 1977.
- GERNEY, P. The effects of Mosston's "practice style" and "reciprocal style" on psychomotor skill acquisition and social development of fifth graders (Doctoral dissertation, Temple University, 1979). Ann Arbor, MI, University Microfilms No. 8014535.
- GRAHAM, G. Research on teaching physical education: A conversation with Larry Locke and Daryl Siedentop. *The Journal of Teaching in Physical Education*, 1981, 1(1), 3-14.
- GRIFFEY, D. What is the best way to teach? *Journal of Teaching in Physical Education*, 1981, pp. 18-24. (Introductory issue)
- GRIFFEY, D. Aptitude \times treatment interactions associated with student decision making. *Journal of Teaching in Physical Education*, 1983, 3(2), 15-32.
- JACOBY, D. A comparison of the effects of command, reciprocal and individual styles of teaching on the development of selected sport skills (Doctoral dissertation, Ohio University, 1975). Ann Arbor, MI, University Microfilms No. 76-10,310.
- JOHNSON, P.W. *A comparison of the effects of two teaching styles on tumbling skill acquisition of college students*. Unpublished doctoral disserta-

tion, Virginia Polytechnic Institute and State University, 1982.

KELLER, J. *The modification of a Physical Education Experimental Teaching Unit*. Unpublished master's thesis, Virginia Polytechnic Institute and State University, 1982.

LOCKE, L. Research on teaching physical education: New hope for a dismal science. *Quest*, 1977, 28, 2-16.

MARIANI, T. A comparison of the effectiveness of the command and task method of teaching the forehand and backhand tennis strokes. *Research Quarterly*, 1970, 41, 171-174.

MELOGRANO, V. *Designing curriculum and learning: A physical coeducation approach*. Dubuque, IA: Kendhall/Hunt, 1979.

METZLER, M.W. Adapting the ALT Instructional Model to physical education teaching. *Journal of Teaching in Physical Education*. 1982, 1(2), 44-55.

MOSSTON, M. *Teaching physical education: From command to discovery*. Columbus, OH: Charles E. Merrill, 1966.

MOSSTON, M. *Teaching physical education* (2nd ed.). Columbus, OH: Charles E. Merrill, 1981.

PEASE, D. Current status and application of instructional strategy research. *Journal of Teaching in Physical Education*, 1982, 1(3), 31-38.

RUPNOW, A. Pedagogical methodology: Should the teaching styles issue be resurrected? *Journal of Teaching in Physical Education*, 1982, 2(1), 48-55.

SCHLOTT, K.A. A comparison of two methods of teaching selected skills in field hockey. *Completed Research in Health, Physical Education and Recreation*, 1970, 12, 226.

SIEDENTOP, D. *Developing teaching skills in physical education* (2nd ed.). Palo Alto, CA: Mayfield, 1983.

VIRGILIO, S. The effects of direct and reciprocal teaching strategies on the cognitive, affective and psychomotor behavior of fifth grade pupils in beginning archery (Doctoral dissertation, Florida State University, 1979). Ann Arbor, MI, University Microfilms No. 8008631.

YOUNG, J. *The influence of academic learning time on the acquisition of a novel motor task*. Unpublished master's creative component, Iowa State University, 1981.