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Kenneth Vern. Stenlund
University of Windsor

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A STUDY OF THE INTERACTION BETWEEN STUDENTS AND EXPERIENCED, NOVICE AND TRAINEE FEMALE TEACHERS OF PHYSICAL EDUCATION IN THE PRIMARY DIVISION

by

KENNETH VERN STENLUND

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ABSTRACT

A Study of the Interaction Between Students and Experienced, Novice and Trainee Female Teachers of Physical Education in the Primary Division

By

Kenneth Vern Stenlund
University of Windsor

This research examined the interaction process which occured between female teachers and their students in the primary grade levels during physical education classes. Teachers from four boards of education (n = 30) in Southwestern Ontario were utilized, with three major groups delineated; experienced teachers (five or more years of teaching experience), novice teachers (2 years or less of teaching experience) and trainee teachers (no teaching experience).

The purpose of the study was to describe, analyse and compare the behavioural interaction patterns of students and experienced, novice and trainee female teachers in the aformentioned grade levels (Kindergarten to Grade Three). The sample teachers were individually videotaped while instructing a

physical education class. Later, these tapes were analyzed using a validated observational system, Cheffer's Adaptation of Flanders' Interaction Analysis System (CAFIAS), in order to determine if significant differences exist among the three teacher groups in their behavioural interaction with students.

The Kruskal-Wallis Analysis of Variance (ANOVA) was used to test for statistical significance between teacher groups, with an alpha level of .05 using the SPSS-X statistical package.

Based on the results of this study, it appears that the trainee and experienced groups have very similar interaction patterns, while the novice group exhibited a distinctive secondary pattern which was unique relative to the other teacher groups studied. Further, significant differences were evident in some specific parameters of the CAFIAS ratios and percentages. Novice teachers in this study utilized group and individual activities more than the other teacher groups. Trainee teachers also had more silence and confusion evident in their lessons than either the trainee and/or experienced groups.

Further, the novice teachers interacted by using different techniques and teaching styles than did the other teacher groups.

This study represents an initial attempt in Canada to collect data regarding teacher and student interaction at these grade levels through the use of CAFIAS within the discipline of physical education.

DEDICATION

To my wife,

mere words could never do her justice
...thank you Lynne,

My daughters,

who willingly sacrificed time with daddy
so that he could finish his "story",

My son,

who kept me laughing when I needed it the
most,

and my Uncle,

...I love you, I miss you, and I thank you.

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Several people have made significant contributions to this study and must be acknowledged.

To my committee members, thank you for guiding this rookie towards the light at the end of the tunnel.

To my committee chairman, Dr. Awender, special thanks for putting up with late night phone calls and inadequate revisions!

To Mr. Bill Paterson...thank you for showing me what teaching is all about.

To Dr. John Cheffers, your wit and wisdom were invaluable to me as I jumped the last hurdle.

To Pat Roberts who did the real work, thank you.

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To my colleagues at the Faculty of Education, thank you for providing your expertise at crucial moments.

To the teachers who let me invade their classrooms, I am in your debt.

To Jim Weese and Paul Fixter, thank you for being there to advise and listen.

And finally, to Race and B.K., what can I say!

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CHAPTER I

INTRODUCTION

Over the years, the delivery system employed by teachers in the instruction of physical education has not received a great deal of attention by researchers. Recently, however, several groups within society have encouraged those teachers involved with the discipline to examine thoroughly their approaches to the subject. Medical groups, governments, and educators themselves are all suggesting that efforts be undertaken to ensure that students are receiving the best possible instruction in the physical education discipline.

This study analyzed the process of interaction within primary classrooms (kindergarten through grade three) between female teachers of physical education and their students and thereby examined at least one aspect of the instructional process with which these groups are concerned.

In order to effect this analysis, three separate groups of female teachers, namely experienced, novice and trainee teachers, were investigated. Data were collected and analyzed by means of a validated observational system, the Cheffer's Adaptation of

Flander's Interaction Analysis System (CAFIAS) in order to determine if statistically significant differences between groups exist.

Background for the study: The Medical Group

Members of the medical community advocate the benefits of a lifestyle which contains a sensible physical fitness component within it. Dr. George Gwozdecky, noted sport physician who has served with the Canadian Olympic program, summarizes the medical consensus by stating "For years, members of the medical community have advocated a daily regime of physical activity. Research tells us that regular exercise is one of the best ways to protect against potential health problems" (G. Gwozdecky, personal communication, August 21, 1987).

Canadians are continually inundated with books, newspaper articles and television commercials generated by the medical profession to educate us as to the benefits of physical activity. Moreover, medical people realize that the physical education classroom represents a prime opportunity to expose young people to physical activity. Consequently, this group has recently begun to turn its attention towards physical education programs within our schools.

What the medical community has discovered is a less than ideal environment. A recent Ontario Medical Association (O.M.A.) report titled "A Position Paper on the School Physical Education Program" (Grace, 1986) examined the current state of physical education programming in Ontario. Dr. Grace, in discussing some of her findings, states:

> ...[with regard to the singular importance of physical education curriculum]. We felt there was really only one place you consistently get kids and give them exposure to good physical fitness (the gymnasium) and we thought it hadn't been addressed very well (Henton & McAndrew, 1986, January 6).

Grace intimates that serious problems exist within the physical education classroom in Ontario. In an attempt to encourage constructive changes, Grace (again in conjunction with the O.M.A.) will release a follow-up report in the spring of 1988. It would appear that the medical community appreciates the importance of effective physical education programming, as well as the efficient delivery of said programming. The ongoing efforts of the O.M.A. exemplify the concern of the medical community in this province.

Educators

Educators have also come to appreciate the benefits of sound physical education programming and instruction as it relates to the physical fitness of students. The notion of "a healthy body making for a healthier mind" is not mere conjecture. In a study conducted in Vanves, France, Latarjet (1933) correlated increased physical activity with increased physical and academic performance (Grace, 1986, p. 2). In his study, Latarjet examined two groups of French school children, one a control group, the other involved in an enriched physical education program of one to two hours per day with an equivalent decrease in time spent on more academically based subjects. The physical benefits were numerous, including fewer days lost to minor illness, increased growth spurt and better physique. Another aspect of the results was the academic record of the enriched group which was as good or better than the control group, despite the decrease in time allotted for more academic subjects. In Canada, the Sherwood School (Regina) and North York projects, using similar experimental formats, have encountered similar results as reported in the Ontario Medical Association Report (Grace, 1986, p. 2).

Consequently, knowledgeable educators increasingly appreciate the importance of sound physical education instruction as a means to improve students' overall performance in our schools.

Governments

Medical groups and educators are not alone in extolling the importance of physical education. In recent times governments have increasingly promoted physical fitness and educational programming. In the United States, during the summer of 1956, the establishment by President Dwight D. Eisenhower of the Presidents' Council on Youth Fitness marked a new era in both the promotion of and research in physical fitness (Zingale, 1984). Five years later, President Kennedy, reviewing information in the first Youth Fitness Report done by the Council, noted with concern that "the softening process of our civilization continues to carry on its persistent erosion" (Presidents' Council on Youth Fitness, 1961, Presidential Message). Most importantly, President Kennedy placed great emphasis on the need for strong leadership from within our schools in order to stem the tide of a "softening" nation.

The Canadian federal government has echoed the sentiments of its southern neighbour. Fully aware of both the medical and social costs associated with an unfit population, it has spent considerable time and money advocating the benefits of physical activity through the program entitled "Participaction". This program is directed at both young and old alike and seeks to further educate and motivate citizens to stay physically active. Additionally, the Canada Fitness program represents an attempt to pique interest in our schools by encouraging young people to stay physically active.

In spite of the information and programming provided by governments as to the benefits of physical activity, it would seem that North Americans continue to "soften". The Ontario Medical Association Report (Grace, 1986) notes that "The pattern of energy expenditure for physical activity for children of the same age was three to four times greater forty years ago" (Grace, 1986, p. 4). This report details that young people continue to pursue a more sedentary life style which consists of less physical exertion and more time spent being physically inactive. Studies show that children spend much more time on a weekly basis

viewing television programming than being active in physical education programming (Grace, 1986; Bailey, 1979). Bailey stated that "in North America, children watch television on average a minimum of 26 hours per week" (Bailey, 1979, Ontario Institute for Studies in Education, p. 10). He further noted that the 26 hour figure is probably a conservative guess. Whatever the exact number, the need for quality physical education programming and instruction in light of these findings, appears to be a timely and important issue.

Investigating The Primary Grades

It might be argued that experiences occurring early in children's school careers establish attitudes towards school and specific subjects which individuals will carry with them throughout their lives. Elkind (1978) suggested that children possess "an early enthusiasm for school" but that these positive attitudes are relatively "short lived" and "by the time they reach the 5th and 6th grade, more than 50% of school children dislike school" (p. 85). Specific to physical education, Bailey (1976), in reviewing literature which details children's attitudes, noted that "if we want adult participation in physical activity it should be remembered that motivation

towards activity is probably laid down at a very early age" (Bailey, 1976, p. 1). Further, he stated that "by (age) 8 or 9, many children have already been either turned on to or turned off sports" (p. 11). McGinnis (1987) concurs, noting that physical activity patterns and attitudes are often influenced in important ways before age 10 (pp. 50-51). These statements lead one to question the types of early school experiences which can turn students against school and specific subject areas. Of particular concern to this research is the area of physical education, and the early school experiences children encounter in this particular area. Given the conclusions of the aforementioned researchers, these experiences will predispose many individuals to regard physical education and physical activity in either a positive or negative manner for much, if not all, of their adult lives.

Ontario Ministry of Education statements also tend to imply a recognition of the importance of the primary division in formulating future attitudes. With specific reference to physical education it has mandated that children in the primary grades "...develop creativity, confidence and physical fitness

through physical activities...(and) develop an understanding of movement and a love of vigorous activity" (Ministry of Education, 1975, p. 19). In Ontario, the Ministry of Education has underscored all physical education instruction and programming with the basic theme of fitness attainment.

Unfortunately, it appears that children in the primary grades do not achieve or maintain acceptable fitness levels through physical education. While conducting the Saskatchewan Longitudinal studies, Bailey (1973) discovered that once children begin their formal school education, fitness levels begin to decline. He stated..."Physical fitness, as expressed by aerobic power factoring out size, seems to be a decreasing function of age from the time we put him (or her) behind a desk in our schools" (Bailey, 1973, p. 425). Research such as this forces professionals who teach within the discipline of physical education to query as to "how" and "why" such situations develop.

Because most children experience their first formal physical education instruction upon entering the primary grades, one must look for the answers at that level. While some students may have outside exposure to community or club teams, by and large it remains the

task of the primary physical education instructor to formally indoctrinate students into the routines of physical education. The importance of these first experiences cannot be overemphasized, and the impact of the teacher will inevitably play a key role in the formation of attitudes as previously discussed. Hence, it is appropriate that the actions and behaviours of primary level teachers of physical education be examined in order to better understand at least one variable affecting the early formulation of attitudes towards physical education and activity.

Investigating A "Female Only" Sample

Given that the primary grades are a vital learning time for students as they form critical opinions and attitudes, research must center on the female portion of the teacher work force within these grade levels The rationale for this statement is a simple one. Currently, female teachers within the primary division in Ontario's schools outnumber their male counterparts by a 15.7 to 1 ratio (Ministry of Education, 1987, "20" Series: Teachers by Level, Table 20-26). Moreover, discussions with Directors of Education suggest that very few schools in Ontario's elementary panel employ full time physical education specialists to instruct in

the primary grades (W. Green, & E. Lozon, personal communications, October 20, 1987). Rather, they point out that the vast majority of classes in physical education within the primary division are carried out by the regular classroom teacher. Therefore, in order to effectively research primary physical education teaching, emphasis must be placed on the female portion of the teacher work force.

Descriptive Analysis/Interaction Analysis

The recent Ontario Medical association Report (Grace, 1986) set down several key recommendations with regard to the effective programming of physical education. While the improvements in curriculum and programming suggested are important, the study failed to address one issue which is central to the effective teaching of physical education in our schools. That is, how do teachers act, react and interact with students during the performance of their duties as physical education instructors? Given that teachers link programming to students, until educators appreciate what transpires between teacher and student, the implementation of new curricula or programs cannot be fully effective.

In order to examine this aspect of primary physical education instruction, the researcher employed a descriptive, analytic approach in the study of teacher-student interaction. Shute, Dodds, Placek, Rife and Silverman (1982) define descriptive analysis as follows:

> Descriptive analysis simply provides a graphic record of selected teaching-learning interactions ...no attempts are made to utilize experimental interventions and only naturally occurring events of teaching and learning are recorded as objectively and systematically as instrument design and training allow (Shute et al, 1982, p. 5).

In light of the main objectives of this study descriptive analysis can provide a graphic record of selected teaching-learning interactions.

Interaction Analysis

Taking a descriptive, analytic approach to the study of interaction analysis is hardly new in the annals of research history. In order to objectively describe events occurring through interaction, observational systems have been developed and tested, the first references to which appear as early as 1914

(Flanders, 1970, p. 6). However, the early use of these observations systems centered on the more traditional classroom based subjects, and consequently the procedures and instruments employed could not be used to measure interaction in a physical education environment. Foremost among observation systems which have evolved from those early beginnings is the Flanders Interaction Analysis System (FIAS). This system, often employed by researchers, centers on the verbal interaction between teacher and learner within the classroom. Although not operational within the physical education context by itself, FIAS has served as a beginning for some observational systems more suitable for use in the gymnasium, on the field, or in other physical education related environments. Flanders pointed out the value of his instrument and the rationale for interaction analysis as follows:

> Interaction analysis, in combination with other inquiry techniques, can provide information about the communication that now exists, can help to identify alternatives that the teacher would like to try, can provide data to indicate whether change has occurred, can become a reference point

for deciding whether a change was or was not an improvement (Flanders, 1970, p. 10).

The development, utilization and refinement of the Flanders system in the early 1970's helped inspire other researchers to create observational systems for use within specific disciplines. In the discipline of physical education, John Cheffers emerged as the leader in research specific to the discipline, and in 1972 adapted Flanders' instrument so that it could be used within a physical education environment. This adapted version of Flanders' system is titled the Cheffers Adaptation of Flanders Interaction Analysis System (CAFIAS). A more detailed examination of both FIAS and CAFIAS will be undertaken in Chapter 3.

Interaction analysis and the use of objective interactive research instruments can be used to accumulate data regarding the interactive process between female teachers of physical education and their students within the primary division of the elementary school. This information should, in time, provide some insight into how physical education attitudes and skills are transmitted at this level. Professor William Paterson, formerly of the Faculty of Education, University of Western Ontario, who has

utilized interaction analysis as a research tool, argues along these lines. He notes:

> There is a body of knowledge that must continually be reshaped and redefined in order that we might better understand, first and foremost, what is happening in our classrooms. Interaction analysis is an effective way to descriptively add to that body of knowledge (W. Paterson, personal communication, July 20, 1987).

Given the benefits of physical fitness, the need for quality programming, and the concern of the aforementioned groups, it appears that how teachers interact with students while teaching physical education is important to our society and worthy of continual research and analysis. This study, then, addresses that important concern.

Purpose of the Study

As indicated earlier, the purpose of this research is to describe, analyze and compare the behavioural interaction patterns of students and experienced, novice and trainee female teachers of the primary division charged with the teaching of physical education.

To attain this purpose the Cheffer's Adoptation of Flanders Interaction Analysis System (CAFIAS) instrument was used. Based on data collected and analyzed utilizing the CAFIAS statistical application, several important aspects of behavioural interaction patterns of the target group were addressed. Among some of the aspects examined were:

1) Do differences exist between the 3 groups in their interaction patterns?

2) If differences do exist in what specific areas are these differences evident?
(Possible areas may be evident in: a) the amount of teacher verbal versus non-verbal behaviour, b) student verbal/non-verbal behaviour, c) percentage of time in groups as opposed to individual or whole class activities, d) percentage of time that the teacher directly influences by teaching versus student teaching or other agencies as "teacher".)

3) Do the findings (either differences or similarities) suggest any important implications for teacher education in the pre-service or in-service education of primary teachers?

In order to examine these questions within a common framework, it is necessary to provide

definitions of some specific terms which are central to the understanding of the study. The terms and their definitions are as follows:

Observational Instrument: A research tool designed to identify and code behaviours of both teacher and student within the classroom.

Interaction Analysis: The process of analyzing (through observational and statistical means) the interaction which occurs between teacher and student within the classroom.

Interaction 'Pattern': The sequence of behaviours exhibited by both teacher and student as expressed dependent upon instrument design.

Prior to focusing on the data generated to address these issues, however, a description of previous research in the area will be offered.

CHAPTER II

REVIEW OF LITERATURE

Introduction

In the course of reviewing research which utilizes descriptive analytic techniques in studying various parameters of physical education, one thing stands out: research specific to the area currently being studied (females in the primary grades) is difficult to obtain. King and Baker (1982) listed and categorized over 520 pieces of research specific to the discipline of physical education for the ten year period between 1969-1979. Included under the category title "Instructional Process" were a mere 15 studies dealing with the interaction analysis processes. Only 12 of these studies had the elementary panel as their major focus for research, and none of these studies utilized a total female sample. Further, only one of the 15 relevant studies was conducted in Canada, that being the study by Paterson (1975). Based on the analysis of the extensive King and Baker listings, it appears that research studies detailing the interaction process between female teachers and students within primary phyiscal education classrooms are few in number. King

and Baker state, however, that "while it is true that only a very limited amount of research has been published in journals or periodicals, it is also true that a great deal of research is being conducted through the medium of thesis and dissertation study" (King and Baker, p. 3).

In light of this statement, several sources of information were reviewed. The Educational Resources Information Center (ERIC), Dissertation Abstracts "On-line" and the Sport Bibliography were all screened via computer searches. Specific physical education publications (such as the Journal of Teaching in Physical Education) were also reviewed. In addition, meetings with Dr. John Cheffers at Boston University and Professor Bill Paterson (formerly of the Faculty of Education, University of Western Ontario) at London, Ontario, provided additional information about other theses, dissertations and articles having some relevance to this study. This information is presented in the following manner: First, a brief historical perspective on the development of observational instruments used to study the interaction between teachers and students in both regular and physical education classrooms is chronicled. Second, major

studies which use a variety of observational instruments across grade levels and sexes are examined. This group consists of two studies based in the more senior grade levels, and which are comprised of different sample groups (male, female and/or mixed samples). Finally, an extensive review of CAFIAS related studies is undertaken. These studies represent the direct foundation of research previously undertaken pertaining to the current study. As well, these studies utilize CAFIAS as the observational instrument for the collection of data.

An Historical Perspective of Observational Instruments

In an effort to advance the science of teaching, researchers in education have examined the processes of interaction between teachers and students in the classroom (Withal, 1949; Flanders, 1970). To this end, they have utilized systematic observational instruments in order to uncover the moment by moment chain of events which take place during the course of a lesson. It is through the understanding of these events that a teacher can more confidently make modifications appropriate to his or her needs in order to affect behaviours within the classroom.

Early researchers who developed and employed these observational instruments focused on more traditional classroom settings and consequently examined interaction in "classroom taught" subjects. Withal (1949) and Bales (1950) were two early researchers who attempted to design and/or utilize some form of systematic observation for the classroom. Withal examined interaction in the social-emotional domain in the classroom, while Bales was chiefly concerned with the conceptual framework for the development of systematic observational instruments. However, foremost among the early researchers engaged in this area of study were Flanders and Amidon. Their pioneer work during the middle 1950s while at the University of Minnesota provided the impetus for a bevy of researchers interested in this particular area of study. Flanders' classic book Analyzing Teacher Behaviour (1970) outlines the seminal observational system which would be employed extensively by researchers in succeeding years. It is labelled as Flanders Interaction Analysis System (FIAS). (see Appendix A) Over time, many modifications and variations of FIAS have been developed (Dougherty, 1970; Nygaard, 1972, Boschee, 1974). Additionally,

other systematic observational instruments have been designed in order to assist in the development of this research area.

Several researchers reacted to the initial work of Flanders (1960) and Amidon (1967) by attempting to develop new observational systems applicable to the specific environment of physical education. Individuals such as Fishman (1971), and Swartz (1971) are among those researchers who created totally different research tools to investigate the interaction process in physical education. Unfortunately, few of these systems have extensive field testing, and fewer still are validated sufficiently to warrant widespread use. Other researchers, such as Dougherty (1970) and Boschee (1974), utilized the Flanders system or some slight variation of FIAS owing to its growing popularity and reliability. A complete review of these pioneer studies can be seen in Paterson's (1975) review. However, two of the studies which utilize FIAS are significant relative to the current study and are therefore reviewed.

Bookhout (1967) was one of the few early researchers to utilize a sample group comprised entirely of female teachers. In her study, the actions

of 36 physical education instructors were researched in order to determine what types of teacher behaviours existed within their classrooms. She proposed six "patterns" of teacher behaviour, via factor analysis which consist of: 1) integrative interaction, 2) restraining interaction, 3) active direction, 4) participation, 5) skill perfection, and, 6) aloofness. Bookhout identified two of the six patterns as being social climate related, those being integrative and restraining. She further noted that integrative interaction by teachers translates into a supportive climate, while restraining types of interaction are more likely to be related to a defensive climate. This study represents an early attempt to delineate what kinds of interaction occur specifically within the physical education classroom.

Nygaard (1972) used FIAS in order to examine the verbal interaction patterns of 19 male and 21 female physical education teachers comprised of both elementary and secondary school teachers. He found that the dominant verbal sequential pattern of female physical education teachers was a 5-10-6-10-5 configuration when utilizing Flanders 10 category system; that is, lecture followed by silence, followed

by direction, then silence and finally lecture. Further, he described female teachers as using less lecture than males, as well as using praise and encouragement, directions or command, criticism or justification of authority, student talk-initiation and silence significantly more than male teachers. He stated that male and female teachers behave quite differently when teaching, and concluded that the two verbal patterns clarify the contrasting teaching styles which exist between sexes.

These two researchers, Bookhout (1967) and Nygaard (1972), use a significant proportion of female teachers in their studies. Moreover, these studies represent initial attempts at investigating aspects of the interaction process which occurs between teacher and student in the physical education classroom. This type of research established the foundation upon which more sophisticated research procedures and instruments relative to the discipline of physical education could be built.

Studies Across Subjects, Grades and Sex Groups

Other studies have investigated the interaction patterns of teachers and students in other subjects,

at levels other than the primary grades, and with varying sample groups based on gender.

Batchelder (1975) studied senior elementary teachers (N = 25) in Maine to determine differences and similarities in the interaction patterns of teachers and students between three subjects: mathematics, English and physical education. She concluded that multiple variations in the interaction patterns do occur between the subjects. Furthermore, she found the dominant pattern in physical education classes to be 6-8 (teacher direction followed by predictable student response), followed by extended lecture (5-5). The latter (5-5) is the primary pattern in both the mathematics and English areas. Secondary findings in the study were that teachers are least comfortable teaching physical education, and teacher objectives for physical education classes are not reflected in the patterning which exists. This study was one of the initial studies to examine physical education relative to other subjects and highlights the apparent uniqueness of interaction patterns prevalent in physical education.

Agnew (1977) studied female physical education teachers in the secondary teaching panel who had

duties as both a physical education teacher and a coach within their respective schools. She compared the interaction patterns of the teachers given two different environments, one being in the gymnasium as "teacher", the other being on the playing field as "coach". Agnew discovered that the interaction patterns are different in both environments and noted that as "coach", the subjects exhibited patterns which include more praise and constructive (soft) criticism. On the other hand, classroom behaviours are more apt to appear as lecture (5), direction (6) and criticism (7). She concluded that the former patterns produce a more appropriate atmosphere, one in which children might more readily enjoy physical education classes. She maintains that the physical education "teacher" should more closely resemble the "coach" in their teaching behaviours.

CAFIAS Studies In Physical Education

In the early 1970s, Cheffers developed and validated a modified version of Flanders system (Cheffers, 1972). This revised instrument enables researchers to include the non-verbal aspects of interaction for studies engaged within the discipline of physical education. This observational system has

been used extensively by researchers. Indeed, the definitive list of CAFIAS related studies as compiled by Detwiler (1986) reveals its wide range of application. This list is divided into "Research Substance" headings of which 54 categories exist. Not all categories are directly related to physical education. This review will focus on those studies which pertain to the current research.

Paterson (1975) appears to be the one researcher in Canada who utilized Cheffers' format. He studied a male sample (N = 30) of physical education teachers in the intermediate division (grades 9 and 10) in southwestern Ontario. The sample was divided into experienced, novice and trainee groups, each consisting of ten teachers. All subjects had been trained in the area of physical education. Paterson videotaped subjects and analyzed the various teacher-learner behaviours. He determined that no significant differences exist between the three groups in their instructional interaction patterns. He further concluded that there is little or no relationship between teaching experience and the instructional interaction patterns of male physical education teachers. Paterson recommended among other

things "that comparative interaction studies between male and female, elementary and secondary school physical education teachers be undertaken to determine the significance of these classification variables for interactions" (Paterson, 1975, p. 53). It is in the spirit of this recommendation, mindful of the differences in degree of specialization between teachers of physical education in the secondary and elementary panels, that the current research is undertaken.

In the United States, several researchers embraced Cheffers' system early in its development. These researchers, many of whom worked in conjunction with or under the tutelage of Dr. Cheffers, have compiled a number of studies which have utilized CAFIAS. Their work represents a substantial amount of the research conducted over the past 15 years. Many of these studies utilize CAFIAS in an attempt to analyze interaction between teacher and learner given various teaching styles or formats within physical education environments.

Mancini (1974) was one of the first researchers to employ the CAFIAS model in his examination of interaction patterns between two distinct decision

making models within the context of the physical education classroom. These two models, called the Teacher Decision Making Approach (TDMA) and the Student Decision Making Approach (SDMA) represent opposite ends of Mosstons' (1966) spectrum of teaching styles. In the TDMA model, students are closely monitored and controlled as to when and where they can move during the physical education class. The teacher gives virtually all the instructions during the activities. Conversely, by using the SDMA model, teachers allow the students to share in many of the decisions which have to be made during the course of a lesson. The study sought to determine the effects of the two models on the amount and types of interaction and participation exhibited between teachers and students. Mancini concluded that the students involved with the SDMA were more actively involved in interacting with their teachers, and further concluded that this group was more physically active throughout the lesson. In addition, he noted that the SDMA children had a more positive attitude with regard to physical activity. Finally, he stated that children in the early primary grades (1 and 2) develop more

positive attitudes about physical activity than do the students in grades 5 and 6.

The Mancini study appears to have acted as a catalyst for additional research. Indeed, in his study, Martinek (1976) modified Mancini's research format only slightly. He included a control group and then attempted to evaluate what effects the two models (TDMA and SDMA) have on motor skill enhancement and self-concept. Martinek concurs with Mancini in stating that as students advance through the school system their self-concept in physical education begins to decrease. However, Martinek noted that the SDMA model had a greater positive effect on self-concept than did the TDMA. The interaction patterns of teachers which vary between the teacher-centered and student-centered models apparently have an effect upon the attitudes and perceptions of physical activity by the students.

Both studies (Mancini, 1974 and Martinek, 1976) utilized CAFIAS to distinguish interaction patterns for teachers of both models. In the TDMA model, the interaction pattern appeared as a 5-6-18-6 configuration based on Cheffers' scale. This pattern translates as teacher information followed by teacher

direction, then student non-verbal (predictable) response and finally teacher direction. This differs significantly from the SDMA model which had a 5-4-18\4-9-2-3 pattern (teacher information, teacher question, student non-verbal interpretive response, teacher praise of performance and teacher acceptance of student performance). Both researchers intimate that the types of activities and teaching formats can have either a negative or positive influence upon the interaction between teacher and pupil.

Subsequent to the Mancini and Martinek studies, several researchers utilized CAFIAS to varying degrees in studies which broadened the scope of application for both TDMA and SDMA models. These studies, conducted by Pirano, 1977; Viglione, 1977; Lydon, 1978; and Schemp, 1981, all investigated TDMA and SDMA relative to their effects on behaviours and interaction in the physical education classroom. The results of this body of studies demonstrates that "for all studies the CAFIAS data and/or verification of the treatment approaches revealed distinct differences in the nature of the teacher-student interactions between the two decision making approaches" (Mancini, Wuest, Cheffers, Rich, 1983, p. 21). Interaction

patterns appear to vary in elementary physical education classes partially dependent on the variable of teaching style or format. These studies are worth acknowledging given the variety of teaching styles utilized by the sample group in the current research project.

Cheffers and Mancini (1979) investigated male and female physical education specialists from both the elementary and secondary teaching panels. Their research attempted to determine if differences or similarities exist in the interaction patterns between sexes. They confirm Nygaard's (1972) earlier findings that female teachers appear to use fewer 5s (lecture) than their male counterparts. However, unlike Nyggard, Cheffers and Mancini made no mention of females using more praise and encouragement in their teaching interactions. Additionally, whereas Nygaard contends that male and female interactions and behaviours are very different, they found little variability of interaction patterns between sexes across both teaching panels. These two findings put into question pre-service training programs currently employed by many teacher training institutions across North America. If no significant differences exist, (as

proposed by Cheffers and Mancini) should institutions maintain divisional formats in pre-service instruction? Additional studies are needed in order to more clearly delineate if differences do exist.

Martinek and Johnson (1979) utilized CAFIAS to determine if "certain expectancy effects" between teacher and student exist within the gymnasium. In essence, the researchers wondered if the "self-fulfilling prophecy" theory applied to physical education classes. The researchers specifically attempted to identify any "differential teacher-student behaviours associated with high and low expectations of teachers in a physical education setting" (Martinek & Johnson, 1979, p. 61). Both male and female physical education specialists were used in the study. They concluded that teachers approach and interact with high achievers with more frequency than the low achievers. Additionally, the high achievers received considerably more praise and encouragement than do low achievers. The authors assert that within the physical education setting, high achievers "have all the advantages", and suggest that teachers be more sensitive to their own behavioural traits which may perpetuate success or

failure among children in physical education when manifested through teacher interaction patterns.

Summary

Researchers have utilized a myriad of observational systems across a range of grade levels and with different sample groups, in order to collect data regarding interaction patterns in physical education. However, the review of literature intimates that only limited research specific to the primary grades and the female teacher component has been undertaken. This study examines a female sample of teachers within the primary grades involved in the teaching of physical education. Through this research the interaction patterns between teachers and students in this specific environment documented, analyzed and discussed.

CHAPTER III

METHODOLOGY

Introduction

As indicated earlier, the purpose of this research is to describe, analyze and compare the behavioural interaction patterns of students and experienced, novice and trainee female teachers of primary grades charged with the teaching of physical education.

The initial chapter of this study details background information applicable to the development of this specific area of study and expands upon the rationale for investigating women teachers in the primary grades who teach physical education. This is followed by a chapter in which literature and previous studies which are relevant to this study are discussed. Studies which utilize Cheffers' Adaptation of Flanders' Interaction System (CAFIAS) as well as pertinent non CAFIAS based research are also reviewed in this second chapter. The third chapter (methodology) details the manner in which data were collected and treated given the purpose of the study.

The analysis and results of the collected data are undertaken in Chapter 4, followed by conclusions and recommendations in Chapter 5.

Rationale For Using Observational Instruments

The process of teaching is an elusive concept, one which cannot easily be defined, let alone "bottled and distributed" for mass use within the educational community. Teaching styles and the way in which one individually approaches teaching vary from classroom to classroom. Mosston (1966) was one of the first researchers based in physical education to attempt to sort out some of the complexities of teaching within the discipline of physical education. His descriptions of various teaching formats as presented in the "spectrum of teaching styles" provided physical education teachers with the framework upon which classroom activities could be conceived and instituted. Nevertheless, many ambiguities relative to teaching and the teaching process still remain. These ambiguities are best summarized by Cheffers who stated, "Everybody knows something about teaching. For too long, however, expertise has been self styled, dogma has gone unchallenged, and individual style has been the excuse for a plethora of dull, ineffective and inadequate

teaching behaviours" (Cheffers, 1978, Association Internationale des écoles superieures d'education physique, p. 7). Through his research, Cheffers attempted to alleviate some of the ambiguities of teaching by utilizing observational systems via interaction analysis as a research tool in the gymnasium, on the playing field, and in any other physical education environment. The major thrust of his research was the development of reliable, objective observational instruments which can effectively describe (if not measure) the behavioural interaction between teachers and students. Cheffers maintained that without scientifically based, objective research tools, the descriptive and evaluatory review of the teaching process is nothing more than subjective opinion (J. Cheffers, personal communication, November 12, 1987).

Anderson (1980), advocated a thorough understanding of the behavioural interaction of physical education teachers. Like Cheffers, Anderson worked to develop effective models for teachers in order to assist in self-evaluation. He maintained that once this occurs, more appropriate teaching will take place within the discipline of physical education. He

also cautioned all teachers, however, that analysis and self-evaluation are not totally "pain free", as time must be spent if results are to follow. He stated, "If teaching were simple, the analysis of teaching would be simple. No training in analysis would be required; our personal approaches would suffice. Teaching is not simple; neither is analysis" (Anderson, 1980, p. 9). Interaction analysis and the use of objective interactive research instruments can then be used to accumulate data about the interaction process between female teachers of physical education and their students within the primary division of the elementary school. This information should, in turn, provide insight into how physical education attitudes and skills are transmitted at this level. Therefore, an observational research instrument is utilized in the course of collecting and analyzing data for this research.

The Instrument: CAFIAS

Cheffers' (1972) modification of the Flanders' Interaction Analysis System (FIAS) represented a breakthrough for researchers pursuing descriptive analytic research in the area of physical education. In order to fully understand Cheffers' research, it is

essential to first examine the basis for his system, namely, FIAS.

The Flanders system utilizes a 10 category format for identification of verbal interactions which occur between teacher and pupil in the classroom setting. The ten categories are broken into the following divisions:

Teacher Talk (Indirect)

1) Accepting feelings of students.
2) Praising or encouraging.
3) Accepting student ideas.
4) Asking questions.

Teacher Talk (Direct)

5) Lecturing (information giver).
6) Giving directions.
7) Criticizing.

Student Talk

8) Predictable student responses.
9) Unpredictable student responses.
10) Silence.

It must be stated that Flanders' categories do not imply any order of importance with regard to the numbering scheme. Each number is simply designated in order to accommodate a coding system. For a more

detailed explanation of Flanders' system, see Appendix A.

While the Flanders' system can provide vital data with reference to verbal interaction, it fails to accommodate any non-verbal parameters. Educators realize the importance of non-verbal interaction as typified by Charles (1985) who maintained that the non-verbal aspects of teaching are very important to the overall effectiveness of the teacher. He mentioned eye contact, physical proximity, bodily carriage, facial expression and gestures as five categories of non-verbal communication which should be effectively utilized by the teacher. Charles goes further in stating that..."discipline in the classroom is 90% effective body language" (p. 90). Such non-verbal expression is extremely important in the gymnasium due to the nature of the classroom and activities inherent within the discipline. Cheffers modified the Flanders instrument (FIAS) in order to include non-verbal interaction as a part of the instrument. However, the inclusion of non-verbal categories within Flanders system does not represent Cheffers' entire revision to FIAS. CAFIAS also provides the coder with subscripts which indicate who is instructing the class at any

at any specific moment during the course of a lesson (other possible "teachers" are students themselves, the environment as in a film loop, or "no instructor"). In addition, CAFIAS allows the coder to identify the types of class formations occurring during the lesson (be it as the class en masse, or the class in smaller groups). For an expanded explanation of these adaptations, see Appendix B.

Darst, Mancini and Zakrajsek (1983) list and categorize most, if not all, of the major systematic observational instruments for use within the discipline of physical education. They note that Flanders' system (FIAS)..."was originally designed for use in the elementary classrooms" (p. 29). As the current study is involved precisely within the elementary panel (primary grades), it is appropriate that the observational system of choice (CAFIAS) is built upon a system specifically designed for use in this particular area. Darst et al. (1983), in reviewing these systems, singles out CAFIAS as one of the best research instruments currently available in the field and stated: "The most popular interaction analysis system employed in physical education, both in pre-service and in-service training and research in the

study of coach and athlete behaviours, appears to be Cheffers' Adaptation of the Flanders System (CAFIAS)" (p. 25). Other systems have been developed and tried with varying degrees of success. Darst et al. (1983) list no fewer than 10 interaction analysis systems and devote a chapter to those which have a direct link to Flanders' original system. Other systems, such as the Rankin Interaction Analysis System (RIAS), the Behaviour Analysis Tool (BAT) and Batchelder-Keane Lecture System (BAKE) are detailed, and have generally been developed for specific spheres of research. However, none approach the wide acclaim or use of the CAFIAS format. Another system, Academic Learning Time (ALT), was modified by Siedentop (1983) for use in physical education and this system continues to grow in popularity. However, this particular system has its basis in "time on task" type analysis, which, though valuable in its own right, is not especially pertinent to the current research. Metzler (1985) notes that ALT is best used "as a variable first, and observational system second" (p. 284).

Since Cheffers' adaptation of FIAS was completed in the early 1970s, one hundred and eleven studies have been conducted utilizing CAFIAS as the

the observational instrument (Detwiler, 1986). Of this number, 72% (N = 80) have investigated, either as a direct or indirect variable (be it teacher or pupil centered) some parameter of physical education instruction.

For the purpose of this study, CAFIAS is utilized as the observational instrument of choice.

The Subjects

The sample for this study consisted of 30 female teachers in the primary division. The subjects were categorized into three sub-groups delineated by the amount of teaching experience within the primary division. These three groups were designated as trainee (ten students) novice (ten teachers) and experienced (ten teachers).

The ten trainees consisted of women enrolled in the University of Windsor's Faculty of Education during the 1987-88 academic year, specifically within the Primary/Junior division. Names were chosen randomly from the list of 118 possible candidates and screened individually to ensure that none of the people in this sub-group had previous experience in the teaching of physical education. In order to observe these teachers before any formal instruction was received by them at

the Faculty of Education (regarding the teaching of physical education) the group members were observed individually during their first practice teaching session. Their initial physical education classes were to begin in the second semester.

The novice group consisted of recent graduates of provincial Faculties of Education who had been teaching full time with their respective boards of education for not more than two years. Additionally, all novice teachers had the responsibility of teaching physical education to their home room classes. As a result, the novice group had limited experience teaching physical education. It is common practice in many boards of education to assign relatively new teachers to two year "probationary" contracts in order to assess suitability towards teaching. Hence, the novice designation, for purposes of this study, recognizes the commonly held probationary period of two years in Ontario.

Finally, the experienced group consisted of teachers with five or more years of experience in the instruction of physical education who were actively involved in the teaching of their own physical education classes. The time frame of 5 years was designated in order to allow for a "grace" period

between the novice and experienced categories. In reality, the mean time spent in teaching among the ten teachers was in excess of eleven years. For definitional purposes, however, "experienced" in this study means a teacher with five or more years of teaching experience in the primary grades.

Four different boards of education were contacted requesting permission to use their schools and teachers in the study. Each of these boards granted permission, and were utilized in the study (see Appendix I). All of the respective boards of education had representation from the group of teachers designated as trainees. Once randomly selected and screened, practice teaching locations for all trainee teachers were identified. Contact was initiated with the respective "associate teachers" prior to the trainee's initial posting. An associate is a teacher currently employed by a Board of Education who agrees to supervise the practice teaching of a pre-service student. All ten associate teachers qualified as "experienced" teachers, and were subsequently asked to participate in the research as the "experienced" component. The ten associates accepted the invitation

and therefore constitute the experienced teacher group of this study.

Novice teachers were chosen at random from the lists provided to the researcher by the four boards of education. Total potential candidates were fewer in number for this group, owing to the restricted amount of new hirings conducted by all four boards of education during the previous two year period. These candidates were approached and all subsequently confirmed as subjects for the study.

Collection of Data

Owing to the nature of descriptive analytic research as previously outlined by Shute et al. (1982), teachers were asked to proceed with their normal curriculum content during the gymnasium class in which data collection was to occur. In order to maintain as "natural" a setting within the gymnasium as possible, the teachers were not given information regarding the nature of the study or the rationale for their involvement. The subjects were guaranteed confidentiality by the researcher with regard to their involvement in the study. Teachers understood that they would be videotaped during their teaching segment for the purpose of analysis at a later date. Prior to

each videotaping session, the children were met in their regular classroom by the researcher in order to familiarize them with their "special friend" for the day. In addition, children were introduced to the videotaping apparatus in order to put them at ease, thereby reducing potential for "unnatural" activities. The children were then instructed to consider two aspects of the filming while in the gymnasium. The instructions were:

1) Forget that anyone is present and participate as you normally would; and

2) Avoid excessive noise making when close to the camera, owing to the importance of audio pick up.

It is worth noting that the participation of all children was exemplary, and indeed, no occurences of acting out or playing to the camera were evident when reviewing the videotapes.

Upon entering the gymnasium, the children were greeted by the researcher who was holding the camera in a "videotaping position". During the initial stage of the class, the camera was in fact turned off. A grace period of up to 20 minutes was used for "pretend" taping by the researcher in order to ensure that all children in attendance would be comfortable with this

different element in the environment. Both the lesson format and content were provided to the researcher prior to entering the gymnasium, and actual data collection began during the main instructional phase of the lesson. Total videptaping duration was never less than 10 minutes, and constituted one segment or activity section of the lesson. Once the taping session was completed, the recorded portion was reviewed in order to ensure acceptability, at which point the researcher thanked the participants and departed.

Coding of Observational Data

All data were collected and stored using standard VHS video cassettes for the purpose of easier coding at a later date. An RCA Solid State MOS Image Sensor (CMR 300) was used to record the lessons. In order for the researcher to code the collected data, the following procedures were employed.

1) An audiotape was prepared which sounded a buzzer every three seconds in order to guarantee a minumum of one behaviour category being recorded every three seconds (the three second format was originally proposed by Flanders, who felt that any less of a time

frame was too hurried for coding, and any longer would create gaps in the patterns).

2) Coding was initially done verbally on another audiotape as opposed to writing (coding) on the CAFIAS work sheet. The rationale for this procedure was to establish coding reliability. Verbal recording allows the investigator to record while giving full attention to behaviours which occurred as opposed to the worksheet itself. Each recorded segment was trial tested three times to assure intra-coder reliability before the final coding for storage was attempted. The researcher then listened to the final audio tape and copied the numbers on to the CAFIAS worksheet. (See Appendix D) This data was then encoded and entered into the computer for analyzing according to the individual ratios and percentages as determined by the CAFIAS statistical package. (See Appendix E) Thereafter, parent cell matrices could be generated for interpretation.

Treatment of Data

The CAFIAS format produces some 25 ratios and percentages. In addition, primary and secondary interaction patterns can be determined based on the construct of the parent cell matrixes which are

generated for each set of inputed data. A detailed account of inputing, encoding and treatment of data can be seen in Appendices C, D and E.

Validity of CAFIAS

Cheffers (1972) measured the performance of CAFIAS compared to that of FIAS using the "blind-live" interpretation technique on four selected physical education classes. In this method of establishing system validity the accuracy of assessments made by observers who have seen a videotape of a class is compared to a similar number of impartial observers who have not witnessed the lesson, but have seen a matrix of the class and have interpreted the matrix. Pearson Product-Moment Correlations between the blind and live interpretations established an r.of.80. This was converted to a t ratio of 3.5 which was significant at the .05 confidence level (Cheffers, 1972).

Reliability of CAFIAS

Cheffers (1972) determined the reliability of CAFIAS through submitting cell rankings to Kendall's Coefficient of Concordance. Two comparisons were made. One compared the total matrices and established a W ranging from .60 to .81. The second compared the 10 main cells and found a W ranging from .44 to .87. Both

comparisons were found to be reliable at or beyond the .05 level of significance.

Intra-Judge Reliability

For the current study, each recorded segment of teaching was trial tested four times in order to ensure consistency in coding. For reliability purposes, one subject was coded on four separate occasions in order to test for intra-judge reliability. Cheffers (1980) recommends the use of Kendall's Tau in determining intra-coder reliability as it controls for any tied ranks. Results of the reliability study can be seen in Chapter 4.

Inter-Judge Reliability

Two outside coders were utilized in order to confirm the reliability of coding for the study. Cheffers of Boston University and Paterson of London, Ontario both have extensive knowledge of CAFIAS, are trained in its use, and were therefore employed as outside coders. Kendall's W. was used to test for inter-judge reliability. Results can be seen in Chapter 4.

Summary

Data were collected and analyzed as detailed in this chapter. Once encoded and run through the

CAFIAS computer program, information relating to the data could be ascertained specific to the emerging interaction patterns of the respective sample groups. Results of this information will be presented in Chapter 4.

CHAPTER IV

RESULTS AND DISCUSSION

The CAFIAS analysis of encoded data yields prodigious amounts of statistical information. In order to disseminate the results of the analysis of data, the following category headings are introduced and discussed:

1) Reliability coefficients and analysis of variance test results,

2) Primary and secondary interaction patterns between groups,

3) Class structure and control,

4) CAFIAS teacher variable categories,

5) CAFIAS student variable categories,

6) Individual CAFIAS category group means, and

7) I/D and i/d ratios.

Statistical results are presented in conjunction with discussion focusing upon the rationale for the findings.

Observer Reliability Coefficients

The inter-observer reliability coefficient was determined to be .91 when utilizing Kendall's W.

(Büning & Trenkler, 1978). The coefficient is significant on the .05 level (see Appendix F). Intra-observer reliability was determined by coding a single videotaped lesson on four separate occasions. Kendall's Tau (Büning & Trenkler, 1978) technique for determining the coefficients was used with the following results; trial 1, 1.0; trial 2, .86, trial 3, .91; trial 4, 1.0. All these reliability coefficients are of significant on .05. This indicates an acceptable level of intra-observer reliability.

Testing For Statistical Significance

The CAFIAS ratios and percentages were generated via the computer program made available through Boston University. The Kruskal-Wallace Analysis of Variance (ANOVA) was used to test for statistical significance between teacher groups, with an alpha level of .05 using the SPSS-X statistical package. Complete numerical calculations for individual CAFIAS ratios can be seen in Appendix C.

Primary and Secondary Interaction Patterns

In order to determine the primary and secondary interaction patterns of the three teacher groups studied, all parent cell matrices were analyzed as detailed in Appendix H. Thereafter, individual group

matrices were created so as to determine an overall interaction pattern for the respective groups.

The combined verbal and nonverbal interaction patterns of each group are presented in Table 1. At this time, a description of the tabulated patterns for each group will be presented.

In the case of the trainee group, the difference between the top two matrix cells (18\ and 5) is marginal. The group matrix (see Table 2) reflects a percentage difference of only 2.2%. One could therefore reasonably argue that there is no single, dominant pattern, but rather a combination of patterns in effect. The primary pattern, 18\-18\, describes extended play by the students consisting of predictable yet interpretive student response requiring the cognition level of application, analysis, synthesis or evaluation.

The secondary pattern is 5-5-6-7-18, which translates as extended information giving, direction, criticism and predictable non-verbal student response. This pattern is replicated in all three groups either as the primary or secondary interaction pattern with the exception of one category. The emergence of 7 (criticism) in the trainee pattern is unique, and

Table 1

Combined Verbal And Nonverbal Interaction Patterns Of Trainee, Novice And Experienced Subjects

	Trainee	Novice	Experience
Primary Interaction Pattern	18\-18\	5-5-6-18	5-5-6-18
Secondary Interaction Pattern	5-5-6-7-18	③-18\-③-18\	18\-18\

Table 2

Trainee Group Parent Matrix Means

CAFIAS CATEGORIES	2	3	4	5	6	7	8	8\	9	10
2	.43	1.61	.11	1.67	.30	--	--	1.21	--	--
3	--	.38	1.21	.18	.12	--	.25	4.42	--	--
4	--	--	--	1.37	--	--	.61	.50	.50	.16
5	.28	.52	1.52	16.70	5.14	5.62	--	.56	.42	.56
6	.11	.31	.11	.47	.28	1.13	4.80	.54	--	.45
7	.61	--	--	.54	.11	.66	1.07	--	--	.31
8	.10	.35	.12	1.18	1.26	.16	.28	1.19	1.15	.90
8\	2.57	3.23	.13	1.28	.96	.22	--	18.90	.13	2.82
9	.18	.10	.20	.51	--	--	--	--	--	.53
10	--	--	.12	1.87	.48	.24	.10	2.46	--	2.54

n = 10

adequately reflects the atmosphere prevalent in many of the trainee directed classes. As a group, the trainees use a command style of teaching with control mechanisms (both verbal and nonverbal) continually utilized. This could be attributed to the concern shared by many new teachers with regard to discipline within their classrooms. It must be noted that the 7 in the secondary pattern (teacher criticism) is intended to reprimand or put down students without encouragement. The CAFIAS categories recognize the "softer", constructive criticism teachers use by placing a 2 immediately after the 7 in coding. This constructive 7 was not utilized extensively by the trainee group.

The novice and experienced matrices produce a primary pattern of 5-5-6-18 which translates as extended information giving, directions, and predictable nonverbal student response (See Tables 3 and 4). This pattern is common among physical education teachers across grade levels and sex (Cheffers, 1988). In the case of the experienced teacher group, the difference between the primary and secondary interaction patterns is 2.3%, (See Table 4) which is virtually identical to the trainee group percentage of difference. Except for the order of the

Table 3

Novice Group Parent Matrix Means

CAFIAS CATEGORIES	CAFIAS CATEGORIES 2	3	4	5	6	7	8	8\	9	10
2	1.34	1.36	.15	1.44	.28	--	--	.88	.32	.11
3	.69	.15	.91	.45	.15	--	1.56	7.39	--	--
4	--	--	--	.98	--	--	.81	.79	.10	.23
5	.51	1.25	1.30	20.88	4.43	.35	.11	.86	.50	.91
6	--	.13	.11	.13	.41	1.08	4.49	.47	--	.32
7	.37	--	--	.53	.13	.25	.87	--	--	.14
8	.47	1.82	.20	1.32	.87	--	.42	1.29	1.09	.63
8\	2.10	5.97	.15	1.65	1.22	.27	--	11.13	--	.24
9	.33	--	--	.48	--	.13	--	--	1.53	.64
10	--	.21	.20	1.31	1.52	.18	--	.11	.18	1.33

n = 10

Table 4

Experienced Group Parent Matrix Means

CAFIAS CATEGORIES	CAFIAS CATEGORIES 2	3	4	5	6	7	8	8\	9	10
2	1.01	1.18	.12	1.87	.46	.18	.12	.85	.14	--
3	--	1.08	1.12	.51	.54	--	--	3.61	.31	--
4	--	--	.33	1.42	.10	.13	.88	.46	.34	--
5	.55	.45	1.08	12.56	7.87	1.08	.63	1.31	.43	--
6	.65	.56	.26	1.59	.89	1.56	6.33	.96	.14	.39
7	.96	--	.21	.90	.55	1.00	1.12	--	--	.10
8	.24	.13	.35	1.83	1.80	.23	1.55	1.82	1.22	.67
8\	2.36	2.89	.32	1.59	1.62	.33	00	10.23	.20	.79
9	--	.58	.10	.53	.18	.13	--	--	.50	1.64
10	.10	--	--	.84	.20	.20	.27	.72	.99	.92

n = 10

patterns, the overall interaction patterns of the trainee and experienced groups are very similar, except for the emergence of 7 (hard criticism) in the trainee matrix.

There are several possible explanations for the similarity between the trainee and experienced groups:

1) the trainee teachers were given preliminary instructions by their associates with regard to the most "effective" manner in which to teach physical education classes;

2) the trainee teachers begin their teaching careers mirroring those teaching patterns which they have been exposed to as students;

3) the experienced teacher group is perpetuating the status quo in physical education instruction; and

4) the experienced teachers manifest teaching behaviours of "least resistance" by their students.

Conversely, the novice group matrix exhibited two distinct patterns. The primary pattern is similar to the experienced group primary pattern, namely 5-5-6-18 (extended lecture, direction, and predictable nonverbal student response). However, the secondary pattern produced for this group is shown to be ③-18\-③-18\, which is verbal and nonverbal acceptance and

utilization of student ideas followed by interpretive student responses. In this particular instance, the ③ intimates that the teachers are actually taking part in the game or activity with their students (as per Cheffers' definition of category 13). The novice teachers represent the only group studied which extensively utilizes this kind of teaching technique. This pattern reflects upon the physical exertion and teaching time spent on task by the novice teachers. As a whole, the novice group appears willing to interact with the children in different ways. This is exemplified by the percentage of time children spent in groups or as individuals, versus time spent with the class as a whole while being taught by the novice teachers. Possible reasons for this unique secondary pattern are:

1) novice teachers have been instructed at various provincial Faculties of Education regarding various teaching strategies and styles (as per Mosston's (1966) "spectrum of teaching styles");

2) novice teachers are testing various teaching patterns in order to determine the most "effective" teaching pattern for specific grade levels;

3) novice teachers are still relative "new

comers" to the profession and possess the energy and ambition to closely interact with students during physical education classes.

In the first instance, it appears that for all groups investigated the 5-5-6-18 pattern is in evidence, either as the primary or secondary pattern. Secondly, in two of the three groups studied (trainee and experienced) the 18\-18\ pattern is used in close association with the other major pattern for the respective group. Thirdly, the trainee group uses "hard" criticism (7) as a part of their secondary interaction pattern to a greater extent than either of the other groups studied. Finally, the novice group produced a unique pattern (③-18\-③-18\) not replicated by either of the other groups studied.

Class Structure And Control

All groups studied have the teacher as the central instructor during the course of the lessons investigated. The group mean for the total sample is 98.93% (see Table 5). This result is as expected, given the age of the students involved and nature of the tasks being undertaken. However, class structure varies in the novice group relative to both trainee and experienced teachers. The novice teachers put the

Table 5

Percentage Comparison Of Group Means In Class Structure
( ) Standard Deviation

VARIABLE	TRAINEE	NOVICE	EXPERIENCED	MEAN
Percentage of time when the teacher is doing the teaching	99.90 (28.16)	99.57 (32.97)	99.28 (36.44)	99.58 (31.77)
Percentage of time when the learner is doing the teaching	0.00 (0.00)	0.62 (1.72)	0.00 (0.00)	0.20 (1.00)
Percentage of time when the environment (a teaching technique) is doing the teaching	0.10 (0.09)	1.80 (5.70)	0.72 (1.81)	0.87 (3.42)
Percentage of time the class spent working as a whole	69.65 (35.75)	*57.49 (27.09)	69.23 (27.26)	65.45 (31.10)
Percentage of time the class spent working in groups or as individuals	29.45 (33.01)	*41.92 (37.01)	21.45 (30.20)	30.94 (30.53)
Percentage of time when the teacher was not influencing the class	0.90 (0.60)	0.59 (0.24)	*9.32 (18.72)	3.60 (11.27)

* Significant at the .05 level.

students in groups, or have them work individually, significantly more than the other two groups of teachers. Although in all instances the teacher remains the central facilitator of instruction and control, the novice teachers apparently use more group work within their lessons.

One additional statistic is worth noting from the table. The experienced teachers registered "no influence" 9.32% of the time, a staggering figure when compared to both novice and trainee groups. A review of the videotaped lessons does not suggest this magnitude of variation. As well, a high "no interest" percentage can often be related to a high "silence and confusion" total (these data are included in the teacher behaviour variables which follow). This positive relationship does not exist, as the percentage of silence and confusion is actually lowest in the experienced group. (See Table 6) The rationale for this statistically unusual result can be seen in the relatively low total number of tallies in the "no interest" category, relative to the total number of behaviours. Cheffers (1980) cautions researchers to consider this factor when reporting findings.

CAFIAS Teacher Variable Categories

Additional statistical information is provided through the CAFIAS analysis above and beyond the interaction patterns and class structure previously described. The data for all three groups relative to the CAFIAS fifteen teacher variables can be seen in table 6. Two statistically significant differences exist between groups. For the purposes of this review, categories 3, 6, 9 and 15 in table 6 (total categories for sub groups) as well as categories 10, 11 and 12 will be highlighted.

The total teacher behaviour category (3) shows the trainee group to be low relative to the other two groups, although the difference is not significant on the .05 level. Simply stated, the trainee group appears to lack the experience and/or confidence to initiate the same percentage of total teacher behaviours as the other groups. One might surmise that the trainees rely more on the curriculum in place to carry them through the lesson as opposed to their own "directing behaviours".

The total teacher question ratio (6) is lower for the novice group relative to the other groups. This can partially be explained as a result of the

Table 6

Percentage Comparison of Groups Means in the Teacher Behaviour Variables

( ) Standard Deviation

VARIABLE	TRAINEE	NOVICE	EXPERIENCED	MEAN
1. Teacher verbal behaviour	37.22 (10.22)	42.07 (7.59)	41.92 (8.10)	40.40 (8.76)
2. Teacher non-verbal behaviour	14.72 (5.05)	18.21 (7.29)	17.93 (5.96)	16.95 (6.15)
3. Total Teacher behaviour combined non-verbal and verbal	51.94 (13.72)	60.28 (11.34)	59.85 (8.25)	57.35 (11.54)
4. Teacher question verbal ratio	13.11 (4.53)	11.62 (6.66)	14.66 (8.73)	13.13 (6.85)
5. Teacher question non-verbal ratio	15.95 (13.23)	8.56 (6.87)	14.51 (11.49)	13.00 (11.10)
6. Total teacher question ratio	14.53 (4.19)	10.08 (6.20)	14.58 (7.18)	13.06 (6.04)
7. Teacher response verbal ratio	39.64 (17.57)	57.70 (17.90)	38.47 (17.51)	45.27 (18.95)
8. Teacher response non-verbal ratio	49.18 (23.52)	56.63 (25.78)	35.62 (20.07)	47.14 (23.99)

* Significant at the .05 level.

VARIABLE	TRAINEE	NOVICE	EXPERIENCED	MEAN
9. Total teacher response ratio	44.41 (16.70)	*57.16 (19.92)	37.04 (18.34)	46.20 (19.35)
10. Percentage verbal behaviour	57.82 (6.47)	57.14 (5.19)	56.53 (4.68)	57.16 (5.32)
11. Percentage nonverbal behaviour	42.18 (6.47)	42.86 (5.48)	43.46 (4.68)	42.83 (5.42)
12. Content cross	39.44 (10.92)	43.33 (14.54)	42.18 (13.60)	41.65 (12.68)
13. Silence	2.66 (2.54)	2.63 (0.79)	2.23 (1.92)	2.50 (1.84)
14. Confusion	5.63 (1.86)	2.71 (1.76)	2.49 (2.80)	3.61 (2.69)
15. Total Silence and Confusion	*8.29 (1.60)	5.34 (1.76)	4.72 (3.62)	6.11 (3.91)

* Significant at the .05 level.

interaction pattern exhibited by the novice group. Many of the novice teachers would make noises or sing along with their students depending on the activity in progress. This type of "participatory teaching" may curtail the opportunities for using questioning techniques.

The total teacher response ratio (9) indicates the novice group to be very high relative to the other groups. Cheffers (1988) states that this is an important factor, in that a higher percentage for the teacher response ratio generally indicates a greater amount of creativity and interpretation on the part of the students. It would appear that the novice group places greater emphasis on both the verbal and nonverbal parameters of this category than either the trainee or experienced teachers.

The total silence and confusion percentage (15) reveals that the trainee group scores significantly higher in this category than the other two groups. The percentage of variable 14 (confusion, 5.63%) is higher than the percentage of variable 13 (silence, 2.66%). It appears that trainee teachers lack some of the organizational skills of the other teaching groups as manifested in the high percentage of confusion. Again,

given the teaching experience (or lack thereof) for trainees, this is not an unusual finding. Cheffers (1988) maintains that a total silence and confusion percentage of 10% or more signifies a disrupted classroom environment. Obviously the trainee groups total percentage of 8.29 is close to Cheffers' "level of discomfort".

Teacher Variable Group Means Compared to Cheffers' Estimates

Cheffers (1988) has suggested possible estimated percentages for the various teacher variable categories of CAFIAS, based upon his extensive research and expertise in this field. These estimates are listed in table 7, and are representative across any number of subjects, grade levels and sample groups. Comparisons can be made regarding teacher behaviour variables for the groups investigated relative to the estimates provided by Cheffers.

All three groups score "very low" in the total teacher question ratio category. This is an accurate reflection of the previously detailed interaction patterns and group parent matrixes. It appears that as a total sample, primary female physical education instructors utilize a considerably limited number of

Table 7

Teacher Variable Group Means Compared to Cheffers' Estimates

VARIABLE	CHEFFERS' ESTIMATES	TRAINEE	NOVICE	EXPERIENCED	MEAN
1. Teacher verbal behaviour 2. Teacher nonverbal behaviour					
3. TOTAL TEACHER BEHAVIOUR	2:1 Ratio (with student behaviours)	LOW	AVERAGE	AVERAGE	SLIGHTLY BELOW AVERAGE
4. Teacher question verbal ratio 5. Teacher question nonverbal ratio					
6. TOTAL TEACHER QUESTION RATIO	40%	VERY LOW	VERY LOW	VERY LOW	VERY LOW
7. Teacher response verbal ratio 8. Teacher response nonverbal ratio					
9. TOTAL TEACHER RESPONSE RATIO	26%	ABOVE AVERAGE	VERY HIGH	SLIGHTLY BELOW AVERAGE	ABOVE AVERAGE
10. % verbal behaviour 11. % nonverbal behaviour	60%) 40%) Ratio	AVERAGE	AVERAGE	AVERAGE	AVERAGE
12. CONTENT CROSS	50%	BELOW AVERAGE	SLIGHTLY BELOW AVERAGE	SLIGHTLY BELOW AVERAGE	SLIGHTLY BELOW AVERAGE
13. Silence 14. Confusion					
15. TOTAL SILENCE AND CONFUSION	4%	VERY HIGH	SLIGHTLY ABOVE AVERAGE	AVERAGE	ABOVE AVERAGE

For numerical values of teacher variable group means, refer to Table 6.

questioning techniques in the physical education classroom. This is not an inconsistant finding across all physical education studies, and could reflect the types of activities inherent in physical education relative to more traditional "classroom taught" subjects.

As previously noted during the discussion of between-group analysis for teacher variables, unique results are evident in both the teacher total response ratio (high for the novice group) and total silence and confusion percentage (high for the novice group). These results are similar when compared to Cheffers' estimates, and the rationale for both remains the same. With specific regard to the high percentage of confusion exhibited in trainee classes, it should be noted that many breaks occur during classes in which trainee teachers perform organizational functions (an example would be setting up cones or removing equipment). Again, this finding is not surprising, as beginning teachers could reasonably be expected to be lacking in many organizational skills pertinent to the physical education environment.

Content cross, which measures the total emphasis put on the content of the lesson by the teacher is

below average for all 3 groups. This can be partially attributed to the type of subject content prevalent in physical education, where interpretive experiences (categories 8\-18\) could push down the group mean.

In summary, of all groups studied, the experienced teachers most often fall within Cheffers' estimates. This could be interpreted to mean that the experienced group reflects the broader teacher profession in that its members are instructing most efficiently and effectively. Conversely, the experienced group might be simply maintaining the status quo within primary physical education classes as established since time immemorial.

The trainee group exhibited the greatest fluctuation against the Cheffers' estimates relative to the three groups studied. This fact could reflect their general levels of inexperience in teaching physical education classes. Both the total silence and confusion and total teacher behaviour variable categories substantiate this contention.

The novice group falls somewhere between the relative stability of the experienced teachers and the volatility of the trainee teachers. Perhaps the single most revealing statistic lies in the total teacher

response ratio in that the novice group is more proactive with their students. This, in combination with the unique secondary interaction pattern of the novice group, intimates that different kinds and degrees of interaction are taking place within the novice physical education classroom relative to the other groups investigated.

CAFIAS Student Variable Categories

Cheffers (1988) maintains that the normal range of total teacher and total pupil behaviour can be expressed as a 2:1 ratio. Table 8 shows the group mean for total pupil behaviour to be 38.03%. The nonverbal component of this ratio is predominant across all three groups investigated. This seems reasonable for a physical education class, where one would expect the majority of behaviour to be manifested through the nonverbal component via physical activity.

The total pupil initiation ratio mean for all three groups is 75.77% (See Table 8), considerably higher than Cheffers' estimate of 45. Again, owing to the high number of 8\-18\ cells in evidence in the three groups studied, this finding is not particularly surprising. Students have the opportunity in physical education (dependant upon such variables as teaching

Table 8

Percentage Comparison of Group Means in Student Behaviour

( ) Standard Deviation

VARIABLE	TRAINEE	NOVICE	EXPERIENCED	MEAN
Pupil Verbal Behaviour	14.97 (7.98)	12.79 (7.26)	12.12 (5.47)	13.29 (6.84)
Pupil Nonverbal Behaviour	24.78 (6.89)	22.00 (7.05)	27.45 (4.49)	24.74 (6.14)
TOTAL PUPIL BEHAVIOUR	39.75 (10.72)	34.79 (10.91)	39.57 (6.74)	38.03 (9.56)
Pupil Initiation Verbal Ratio	87.86 (13.47)	77.86 (16.04)	80.02 (16.48)	81.91 (15.40)
Pupil Initiation Non-Verbal Ratio	74.28 (17.01)	72.11 (13.46)	62.52 (21.97)	69.63 (17.98)
TOTAL PUPIL INITIATION RATIO	81.07 (16.71)	74.98 (10.95)	71.27 (20.15)	75.77 (16.47)

style and curriculum) to initiate in both the verbal and nonverbal domains.

The percentage comparison of group means of unpredictability (as expressed through unstructured verbal and nonverbal) produced some surprising results (See Table 9). Cheffers notes a normal range of 40-50% across various subjects for this category. All three groups have a significantly higher verbal component, normally expressed as a 9 in the CAFIAS system (unpredictable student response). The totals for the three groups indicate that trainees had the lowest percentage, that being 11.07%. Given the trainees' apparent need to maintain discipline and control within the classroom, this finding seems acceptable. However, both the novice and experienced groups have total percentages at or close to 20% level. This appears inconsistent with some of the findings previously detailed. Upon closer inspection, it would seem than the 23.49% indicated for the experienced group may relate to the high percentage of time the experienced teachers are categorized as having "no interest". That is, much of the unpredictable student activity occurs when the experienced teacher is not serving as the controlling factor in the classroom. The

Table 9

Percentage Comparison of Group Means of Unpredictability

( ) Standard Deviation

VARIABLE	TRAINEE	NOVICE	EXPERIENCED	MEAN
Unstructured Verbal	15.85 (15.35)	26.38 (16.63)	32.39 (25.31)	24.87 (20.15)
Unstructured Nonverbal	6.30 (4.26)	12.02 (17.22)	14.59 (14.51)	10.97 (13.24)
TOTAL (Unstructured Verbal and Nonverbal Ratio)	11.07 (5.30)	19.20 (16.36)	23.49 (17.36)	17.92 (14.57)

investigator is hesitant to proclaim this percentage as appropriate or inappropriate in as much as many of these behaviours were not task or game related. Again, total tally counts for this ratio relative to total behaviours may be inflating the percentage scores.

In summary, it would appear that as a group, primary physical education teachers (female) encourage pupil initiation through the activities inherent to the discipline. At the same time, these same teachers appear to curtail unstructured or unpredictable activity, relative to other subject areas. This may be a direct result of the control mechanisms utilized in the physical education classroom, specific to its unique environment.

CAFIAS Teacher Category Group Means Compared to Cheffers' Estimates

Individual CAFIAS category means for each group were tabulated for inter group comparisons. In addition, Cheffers (1988) provides percentage estimates across various subjects, grade levels, and sample groups which can be compared to the tabulated group means. Results of both teacher and learner category means can be seen in Table 10. Between groups, several discrepancies can be witnessed in this table. Trainees

appear to score lower than both the novice and experienced groups in two of the three indirect teacher behaviour categories (2-12 and 3-13). It would seem that the trainee teachers do not praise or accept student ideas as often as the other groups examined. The trainees encourage student predictable yet interpretive responses (8\-18\), yet do not encourage as much student unpredictable activity (9-19). In addition, the trainees have a significantly higher percentage of silence or confusion (10-20) relative to the other groups.

In the case of the novice group, the high incidence of categories 3 and 13 is consistent with the secondary interaction pattern previously discussed. It would appear that of the three groups, the novices give the most instructions (5-15) yet criticize less than either of the other groups (7-17).

Finally, the experienced teachers give significantly more directions (6-16) than either the novice or trainee group. A somewhat surprising finding is that the experienced group use more "hard" criticism (7-17) than any other group. It should be noted that this percentage represents total cell tallies as opposed to the specific cell loadings found

Table 10

Individual CAFIAS Category Group Means (Teachers)

( ) Standard Deviation

CAFIAS Category	Cheffers' Estimates	Trainee	Novice	Experienced	Mean
2-12	4-6%	04.4 (03.0)	05.9 (02.9)	06.0 (03.0)	05.4 (03.0)
3-13	1-2%	06.1 (05.9)	09.7 (07.9)	07.0 (11.6)	07.6 (08.5)
4-14	5-7%	03.6 (01.4)	03.2 (01.5)	03.7 (02.0)	03.5 (01.6)
5-15	30-40%	25.2 (08.3)	29.2 (13.2)	23.5 (06.8)	25.9 (09.8)
6-16	30-40%	08.7 (03.1)	08.4 (02.9)	*14.2 (03.0)	10.4 (04.0)
7-17	1-2%	03.6 (02.7)	02.4 (01.4)	04.8 (03.4)	03.6 (02.7)
8-18	40-50%	07.1 (03.8)	08.3 (04.7)	10.9 (06.3)	08.7 (05.1)
8\-18\	20-30%	30.2 (12.5)	22.9 (11.3)	20.0 (11.0)	24.3 (12.0)
9-19	3-5%	02.3 (01.2)	03.7 (03.6)	04.3 (03.6)	03.4 (03.0)
10-20	3-4%	*08.3 (01.6)	05.3 (01.7)	04.7 (03.6)	06.1 (03.9)

* Significant at the .05 level.

in the trainee secondary interaction pattern. This means that while trainee teachers tend to use criticism in a certain order and after certain events, experienced teachers are more apt to randomly criticize. It would also seem that experienced teachers know what they want from their students, owing to the higher percentage of predictable student response (8-18). This is reasonable given the higher levels of direction utilized by the experienced teachers (6-16), as predictable student nonverbal response (18) usually follows directions given by a teacher (6). Finally, it should be noted that of the three groups, the experienced teachers have the lowest percentage of silence and confusion.

When compared to the Cheffers' estimates for the teacher variable categories (2-7) the mean scores of the three groups, as seen in table 11, shows the following.

Table 11

Combined Group Teacher Variable Means Compared to Cheffers' Estimates

CATEGORY	CHEFFERS' ESTIMATES	TOTAL GROUP MEANS	COMPARISON
2-12	4-6%	05.4%	.Average praise
3-13	1-2%	07.6%	.Above average acceptance of student ideas and feelings
4-14	5-7%	03.5%	.Below average questioning
5-15	30-40%	25.9%	.Below average information giving
6-16	30-40%	10.4%	.Below average directions
7-17	1-2%	03.6%	.Above average criticism

To summarize table 11, it appears that as a total group the physical education teachers investigated give only average praise and encouragement, yet utilize student ideas and get involved with their students to a greater extent than other teacher groups. And, while they apparently question less, they appear to talk less as well. These findings seem reasonable given the unconventional environment that constitutes the physical education classroom. Physical activity on the part of the students apparently circumvents the need for lengthy periods of verbal instruction as evidenced by categories 4-14, 5-15, and 6-16. Interestingly, the group mean for criticism (7-17) is above average, though only slightly. Again, this could be partially attributed to the physical environment of the gymnasium, where control and discipline techniques might vary from the more traditional classroom.

Student variable comparisons can be seen in table 12. Student variable categories 8-18 and 9-19 are within Cheffers' estimates, while category 8-18 is below the estimate indicating that these particular physical education students give less predictable responses (both verbal and nonverbal) during class instruction. The findings coincide in

Table 12

Combined Group Student Variable Means Compared to Cheffers' Estimates

CATEGORY	CHEFFERS' ESTIMATES	TOTAL GROUP MEANS	COMPARISON
8-18	40-50%	08.7%	.Below average predictable student response
8\-18\	20-30%	24.3%	.Average higher order predictable student response
9-19	3-5%	03.4%	.Average unpredictable student response

part with the interaction patterns previously detailed, as the 8\+18\ pattern is prevalent in all three groups (either in the primary or secondary patterns). It would seem that students in this study provide more verbal and nonverbal interpretive answers requiring the cognition levels of application, analysis, synthesis or evaluation.

In summary, the mean percentages of the three groups combined fall within Cheffers' estimates in only three of the ten CAFIAS categories. It would appear that the primary physical education classroom is an atypical environment when compared to other subject areas. The CAFIAS category analysis point to the uniqueness of the physical education environment from the perspective of both teacher and student.

I/D and i/d Group Ratios

Total verbal and nonverbal direct and indirect teacher behaviour ratios are listed in Table 13. Results suggest that for the I/D ratio (total indirect categories divided by total direct categories) all three groups use a predominance of categories based in the direct categories of 5-15, 6-16, and 7-17. It

Table 13

Percentage Comparison of Group Means for I/D and i/d Ratios

( ) Standard Deviation

	TRAINEE	NOVICE	EXPERIENCED	MEAN
I/D	0.37 (0.16)	0.47 (0.37)	0.39 (0.37)	0.41 (0.32)
i/d	0.85 (0.73)	*1.40 (1.13)	0.68 (1.09)	0.97 (1.05)

* Significant at the .05 level.

appears that the teachers utilize direct teacher behaviours as opposed to indirect teacher behaviours.

The i/d ratio does not include categories 4, 14, 5 and 15 in its formula, owing to the high frequency of the latter two categories. This ratio is designed to indicate the types of control and motivation evident in the classroom. Of interest is the high novice ratio of 1.40. This indicates that the novice teachers use more praise (2-12) and acceptance of feelings (3-13) as opposed to direction (6-16) and criticism (7-17). Both the trainee and experienced groups use more of the direct behaviours in both I/D and i/d ratios. The variations in the i/d ratio between the novice, trainee and experienced groups indicates that the novice teachers are attempting to utilize a greater proportion of indirect teacher behaviours relative to the other two groups investigated.

Summary

Based upon the results of the analysis of data compiled through the various CAFIAS parameters, it would appear that:

1) the trainee and experienced groups show strikingly similar behavioural characteristics in the teaching of physical education at the primary level;

2) the novice group appears to exhibit several distinctive characteristics when compared to both trainee and experienced teachers as evidenced by: the secondary interaction pattern (③ - 8\ - ③ -18\); variable class structure (more group work); a higher teacher response ratio; and a varying i/d ratio (using more indirect teacher influence).

The results emanating from this study substantiate some of the findings from previously reviewed research. The predominant interaction pattern (5-5-6-18) for the groups investigated appears to closely parallel the interaction pattern proposed by Martinek (1976) for the TDMA model, that being 5-6-18-6. One can surmize that the teachers investigated in this study are using a teacher centered format in their teaching styles, as expressed through their interaction patterns. Several researchers including Mancini (1974) and Martinek (1976) state a strong preference for the SDMA classroom structure. It appears that little of the SDMA format is operable within the classrooms studied. This can be partially attributed to the grade level being studied, and yet previous research has utilized SDMA at the same levels with beneficial results. It would seem that this particular sample group of teachers had made

little or no attempt to alter the predominant teacher centered environment in the physical education classroom.

Several researchers, including Bookhout (1967) and Agnew (1977) make reference to the atmosphere in evidence during physical education instruction. They intimate that certain teacher behaviours could be more appropriate for this specific environment. The findings of the current research leads one to observe that the atmosphere in evidence for the majority of classes studied is one created by the teacher, for the teacher. With the exception of the novice group, most classrooms were strictly controlled and monitored by the teacher present. Indeed, the lessons taught by the trainee teachers had teaching style, not lesson content, as the predominant aspect of the lesson. While this can be rationalized in part for a beginning teacher, the criticism levels in evidence for the experienced teachers are less easily justified. It would appear that much of the research literature which makes note of atmosphere as a meaningful component of the physical education experience has not impacted at the Kindergarten-3 levels.

Martinek and Johnson's (1979) contention that high achievers receive "all the advantages" is not in evidence through this study. A review of the videotapes leads one to propose that the teachers investigated show no favouritism for specific individuals during the course of a lesson. Indeed, most teachers identify students (if and when they did in fact identify specific individuals) in a negative, rather than in a positive manner. That is, individual students are often criticised for inappropriate behaviour, but rarely praised for individually appropriate behaviour.

Paterson (1975) finds no significant differences among trainee, novice and experienced male physical education teachers. The findings of the current study suggest that differences do exist, given a different grade range in conjunction with a female, rather than male teaching sample. The novice teachers appear to utilize different teaching behaviours and classroom structures when teaching physical education, a finding not documented by Paterson. Discrepancies in this finding relative to the Paterson study can be partially explained in that Paterson's teaching group consist of physical education specialists. He maintains that

little difference occurs between groups across the CAFIAS variable, while the current research identifies the novice teacher group as having generated some significantly different results relative to both the trainee and experienced groups.

In summary, Cheffers (1988) maintains that no system for observing teacher and student interaction is infallible, and indeed, anecdotal discussion of findings can and should be used in the evaluation of data produced. A review of the videotaped lessons confirms the statistical findings as reported in this chapter. Of the three groups, the novice teachers did exhibit variability in their teaching behaviours relative to the other groups investigated. Ramifications of this variability will be discussed in Chapter 5.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of this study was to describe, analyze and compare the behavioural interaction patterns of students and experienced, novice and trainee female teachers of the primary (K-3) grades charged with the teaching of physical education. Based upon the analysis of data, it appears that:

1) No apparent differences occurred between trainee and experienced teachers in their total behavioural interaction patterns.

It seems that very little difference exists in the teacher behavioural approaches of new teachers and experienced teachers in the teaching of physical education. The generally held axiom that "experience is the greatest teacher" must be questioned, as the trainee teachers (with no experience of any consequence) showed very similar teaching behaviour when compared to the experienced group as expressed via group parent cell matrices.

2) Substantial differences occurred in the secondary interaction pattern exhibited by the novice

teachers when compared to both trainee and experienced groups.

The novice teaching group exhibited teaching behaviours and an interaction pattern not witnessed in either of-the other groups. Based on the secondary pattern of interaction, it can be surmised that teachers in the novice classrooms were interacting with their students using different kinds of teaching behaviours and/or teaching styles and/or interaction processes.

3) No significant differences occurred among groups with regard to the controlling teaching agency (teacher as teacher) in the classroom.

While differences did occur in style and form of class structure and application, the findings of this study clearly indicate that teachers attempt to maintain control of the class a majority of the time as the predominant teaching agency at these grade levels.

4) No significant differences occurred in the pupil behaviour variables among groups.

Students appear to understand their duties and "roles" as students in a physical education classroom. There appears to be little variability in pupil behaviour across groups at this level.

5) Significant differences occurred in two of the fifteen teacher variables, where the Total Teacher Response Ratio was significantly higher for the novice group, and Total Silence and Confusion was significantly higher for the trainee group.

The high total teacher response for the novice group generally indicates a greater amount of creativity and interpretation on the part of the students for this specific group. This indicates that of the three groups investigated, novice teachers most often encourage students to experiment with ideas or concepts presented during the course of a lesson. The higher percentage of group and individual work by the novice teachers is one indicator of this kind of prevailing atmosphere.

As to the higher average amount of silence and confusion in the trainee classroom, this statistic is not unexpected. The trainee group investigated had received a minimal exposure to matters of organization vis-a-vis classroom management which can in part explain this occurrance.

6) Significant differences occurred in the variable relating to class structure, as the novice group used more group and individual formats during

instruction than either the trainee or experienced groups.

The novice teachers appear more receptive in allowing their students to work as part of a group in the mastery of a skill or activity. One could surmize that as a group, novice teachers experiment with various teaching styles and organizational concepts in order to ascertain relative effectiveness.

In addition to the aforementioned conclusions, certain descriptive, comparative statements can be made pertaining to the total sample investigated with regard to the teacher norms provided by Dr. John Cheffers. Among these statements, some of the more important findings of this study include:

1) Primary female teachers of physical education appear to utilize less extended information giving and direction than other teacher groups across subjects.

The teachers investigated in this study appear to talk less than teachers in other subject areas. Given the content of a lesson normally associated with physical education (where activity, in the physical sense, is occurring) this finding is not surprising.

2) Primary female teachers of physical education appear to use praise in similar proportions to other

teacher groups across subjects, yet give more criticism than other teacher groups.

It would seem that teachers use praise in a similar fashion across subjects, with physical education no exception. However, it also appears that teachers in this physical education environment are more apt to criticize students during physical education instruction than they would otherwise. The number of critical statements or gestures, especially in the trainee and experienced groups, are greater in physical education as expressed via Cheffers' norms.

3) Primary female teachers of physical education appear to utilize fewer questioning techniques than other teacher groups across subjects.

In this study, all three teacher groups score very low in utilizing questions when compared to Cheffers' norms. This can be partly attributed to the fact that students are actively "doing" their lessons in a physical sense, hence the opportunities for teachers to ask questions could be restricted. However, the teachers studied fail to use questioning techniques during the instructional phase of the lesson as well, which is difficult to explain or rationalize.

The results of this study, both from a statistical and antecodal perspective, lead the researcher to conclude that teacher behaviours exhibited by the majority of participants were designed to maintain continuous control of the environment. It would appear that the teachers are perpetuating the traditional physical education classroom which has existed since time immemorial. Little variability as per Mosston's recommendations, with the exception of the novice group, appears to exist. Personal communications with many of the teachers studied unearthed a general uneasiness about teaching physical education for any number of reasons. As one teacher succinctly stated, "I do what it takes to survive and keep my sanity in the gym!" The teacher behaviours exhibited through the results as previously discussed appear to confirm the notion of "survival first" as the norm, not the exception, for many of the teachers studied. The results of this study should indicate to instructors at the various Faculties of Education that review is necessary regarding the teaching pedagogy employed for pre-service students. As previously stated, it appears that little difference exists between the most veteran teachers and new, beginning teachers when expressed in

teacher behaviour through interaction patterns. One could surmise that the pre-service training taking place is having little or no impact on teacher behaviour in the long term. Physical educators involved with the teaching of teachers must therefore re-evaluate the objectives of pre-service training procedures and course content in light of what appears to exist in primary classrooms. As previously noted, fitness levels among our young people continue to decline. In addition, students are increasingly opting out of physical education once it becomes optional at the high school level. One cannot reasonably deduce that primary grade teachers are the sole agents responsible for these alarming trends. However, these teachers must surely play a part through their classroom management and instructional techniques. Therefore, teachers engaged in the preparation of new teachers must evaluate if pedagogical and programming objectives at the pre-service level positively correlate with what is actually occurring in primary physical education classrooms.

Effective Teaching

As a result of the conclusions drawn from this study, the researcher is compelled to address the issue

of which of the three groups studied exhibited the most effective classroom behavioural interaction in the course of instructing physical education classes. Although it is at best difficult to make generalized statements regarding teacher effectiveness, the nature of this research dictates that an attempt to differentiate between groups be made.

Of paramount importance when delineating effectiveness within the teaching context is the definition one holds for the word "effective". Undoubtedly, innumerable definitions of effective teaching exist. Hellison (1973) provides one such definition. He maintains that teachers will be judged effective if their students gain knowledge, regardless of the teacher's methods. As with all definitions in this context, arguments both pro and con could be made. Perhaps one of the most pertinent and recent definitions of effective teaching within the specific discipline of physical education is given by Pieron and Cheffers (1988) who state:

> Effective teachers are those who are able to maintain their students appropriately involved and on task during a large part of allocated time without using negative or coercive methods. The

components of teaching effectiveness could be: 1) a large proportion of time devoted to subject matter taught; 2) a high rate of behaviours directly related to the learning tasks; 3) an adequate matching of the content of teaching with students' abilities; 4) the development of a positive climate in the classroom (p. 190-191).

Within the context of this definition, and based upon the data generated through this study, it appears that the novice group of teachers represent an "effective" departure from the norms established by both the trainee and experienced groups. More than the other groups, novice teachers exhibit differing class structures, more teacher involvement with students (as in physically participating in activities) and more indirect teaching techniques. Possible reasons for the differences which occurred between the novice group relative to the other teacher groups studied have been discussed in part throughout Chapter 4. It must be noted, however, that certain limitations inherent to this study must be considered when discussing results and conclusions.

This study is representative of one classroom experience on the part of each teacher investigated.

Teacher interaction patterns and behavioural characteristics are therefore presented within that context. In addition, the study's findings reflect the degree of sensitivity of the observational instrument that was utilized for this study. While CAFIAS remains the state of the art in this area, it represents only the beginning of more complex and complete systems to come. Cheffers himself acknowledges this fact and indeed encourages researchers to develop "new and improved" observational systems.

Recommendations

In light of the findings of this study, the following recommendations are suggested:

1) That further research studies be conducted in the area of teacher and student interaction within the discipline of physical education in order to establish a large data base unique to the Canadian educational environment.

2) That a research studies be undertaken utilizing novice teachers in order to corroborate the findings of this study.

3) That longitudinal research be undertaken to test the hypothesis that novice teachers will begin to

behave in ways more like the experienced teachers reported in this study as they gain experience.

4) That Faculties of Education utilize observational systems in examining pre-service teachers behavioural teaching patterns. The use of these systems could assist in the design of appropriate pedagogical formats to enhance the preparation of new physical education teachers.

5) That in-service physical education courses be made mandatory for all teachers responsible for teaching physical education at the elementary level. These refresher courses could assist in disseminating new information regarding "effective" teaching behaviours within the physical education discipline.

Should these recommendations be implemented, valuable information for and about teachers of physical education will emerge. This new information will undoubtedly be of benefit to both the teachers responsible for the instruction of physical education and their students within our educational system.

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APPENDICES

The author gratefully acknowledges the permission granted by Dr. John Cheffers and Mr. William Paterson to reproduce documents for inclusion in the following appendices.

APPENDIX A

THE FLANDERS INTERACTION ANALYSIS SYSTEM (FIAS)

Flanders Interaction Analysis System (FIAS)

Systematic observational classroom analysis can help improve instruction by providing teachers with objectives and reliable information about their teaching behaviour. The Flanders (1970) Interaction Analysis System is such an instrument that can be used to accomplish this purpose. FIAS provides a measure of verbal interaction between the teacher and the learner.

Specifically teacher-learner interaction is divided into ten categories, seven of teacher talk, two of student talk, and one of silence or confusion. Table 1 lists the ten categories, their operational definitions and the major areas.

Table 1

Categories - Flanders' Interaction Analysis System

TEACHER TALK	INDIRECT INFLUENCE	1. • **ACKNOWLEDGES FEELINGS:** Clarifying or dealing with the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting or recalling feelings is included.
		2. • **PRAISES OR ENCOURAGES:** Praising or encouraging student action or behavior. Jokes that release tension, but not at the expense of another individual; nodding head, or saying "um hm?" or "go on" and statements of confirmation such as "That's right" are included.
		3. • **USES IDEAS OF STUDENTS:** Clarifying, building on, summarizing, developing or repeating exactly the ideas suggested by a student. As teacher brings his own ideas into play, shift to Category 5.
		4. • **ASKS QUESTIONS:** Asking a question about content or procedure with the intent that a student answer.
	DIRECT INFLUENCE	5. • **LECTURES OR ORIENTS:** Giving facts or opinions about content or procedures; expressing his own ideas, asking rhetorical questions.
		6. • **GIVES DIRECTIONS:** Giving directions, commands, or orders with which a student is expected to comply.
		7. • **CRITICIZES OR JUSTIFIES AUTHORITY:** Statements intended to change student behavior from nonacceptable to acceptable pattern. Bawling someone out. Using the fact that one is the teacher to justify a point or to counteract student response.
STUDENT TALK		8. • **STUDENT TALK–LIMITED:** A student makes a predictable response to teacher. Teacher initiates the contact or solicits student statement and sets limits to what the student says.
		9. • **STUDENT TALK–UNLIMITED OR INITIATED:** Open-ended or unpredictable statements in response to teacher. Talk by students, which they initiate. Shift from 8 to 9 as student introduces own ideas.
		10. • **SILENCE OR CONFUSION:** Pauses, short periods of silence, and periods of confusion in which communication cannot be understood by the observer.

*There is NO scale implied by these numbers. Each number is classificatory: it designates a particular kind of communication event. To write these numbers down during observation is to enumerate—*not to judge* a position on a scale.

Cheffers, J. T., Mancini, V. H. & Martinek, T. J. (1980). Interaction Analysis. Association for Productive Teachers, Minneapolis, Minn., p. 10.

The observational and coding techniques employed by the Flanders system is as follows:

1. Every three seconds the observer codes the category number of the interaction he just observed. If more than one type of interaction occurs within the three seconds, all interactions are recorded.
2. The coding or category number are recorded sequentially in a column. For example:
   1) teacher asks a question (Code 4)
   2) a learner uses the learner's reply (Code 8)
   3) the teacher uses the learners' reply (Code 3)
   4) the teacher asks a question (Code 4)
   5) There is no reply for five seconds (Code 10 silence)
   6) Learner replies (Code 8)

From this brief interaction we have the following data:

10
4
8
3
4
10
8
10

NOTE: The coding always starts and finishes with category 10, based on the assumption that lessons begin and end with silence.

If an observer coded behaviour every three seconds, in a twenty minute lesson, this would yield a minimum of approximately 400 numerals, viz. category code numbers.

3. The preparation of the Flanders Interaction Analysis System Matrix.

The matrix consists of a 10 x 10 grid (see Table 2). The intersections formed by the crossings of rows and columns are designated as cells. The cells are numerically identified within the matrix by their row and column location. For example the 5-5 cell is formed by the intersection of the fifth row and fifth column.

The preparation of the matrix involves the following steps:

1) The category numbers coded by the observer are listed in overlapping pairs (see example above) in their time sequence.

2) Each pair is now entered in the matrix by locating the appropriate cell in the matrix. The first number of the pair indicates the row location, and

the second number the column location. Note each number is given a double entry as the first and second member of the pair. For example using the above data, the first pair is 10-4, so go down to row 10, and over to column four and enter a has mark in the cell (see figure 2). The next pair is 4-8, so go to row 4 and over to column 8 and enter a hash mark. This is the same for every pair.

4. The interpretation and analysis of the matrix.

When the matrix has been completed the following computations are necessary in order to interpret and analyze the data.

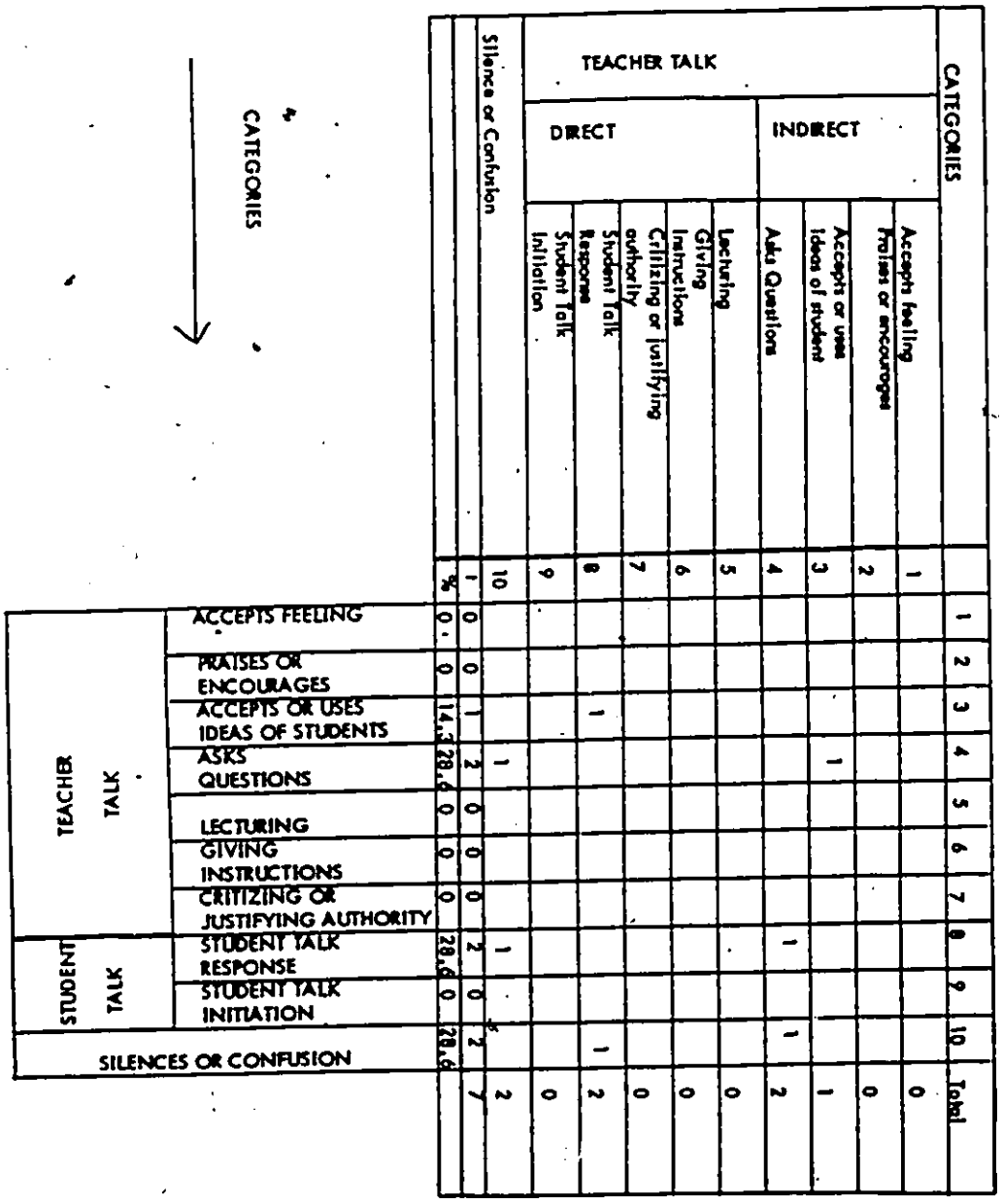
(1) The number of tallies in each cell are computed and recorded.

(2) The rows and columns are added and recorded.

(3) The column percentages are calculated and recorded.

Table 2

Categories and Matrix - Flanders



From Paterson (1975), p. 70.

APPENDIX B

CHEFFERS ADAPTATION OF THE FLANDERS INTERACTION ANALYSIS SYSTEM (CAFIAS)

Cheffers' Adaptation of the Flanders Interaction Analysis System (CAFIAS)

As previously stated, Cheffers had attempted to overcome certain limitations in the Flanders system, and made the following changes in the instrument:

1. Added categories to decribe the nonverbal aspect of both teacher and learner behaviour. The nonverbal categories are coded as the "teen" equivalent of the verbal categories.
2. Added subscripts to show whom or what is doing the teaching, the teacher, a student (S), or the environment (E).
3. Designated category ten for chaos and confusion, and twenty for silence.
4. Category one, the acceptance of student feeling by the teacher is coded as in Flanders, but is combined with category three in the matrix.
5. Added a new category eine (8\) and the nonverbal equivalent being eineteen (18\). This new category is introduced to differentiate student predictable responses which show evidence of a higher cognitive level; that is, application; analysis; synthesis; and evaluation. Category

eight is used for predictable student verbal responses for a lower cognitive level, that is knowledge and comprehension.

6. Added subscripts to determine the percentage of time the class spent as a whole (W), in smaller groups or individuals (P), or (I) if the teacher is not directly influencing the class, e.g. correcting work at his desk, answering a telephone, etc.

Ground Rules for Coding CAFIAS

In some cases an observer may have a reasonable doubt about: 1) who and what to code, 2) a conflict between the selection of a specific behaviour category. As a result Flanders (1970) and Cheffers (1980) suggest the following ground rules:

1. When the class structure breaks into parts, that is, groups or individuals, (coded P), the observer will follow the teacher and code the interaction with the teacher and the individuals or groups. If the teacher is not interacting, but hanging a poster on the gym wall, answering a telephone etc., then the observer codes a (1) indicating he or she is not influencing the learners.

2. When the teacher is talking and demonstrating at the same time, the observer will code the verbal symbol and encircle it. For example, if the teacher is giving direction verbally, and pointing with his or her hand, it is coded as a (6). This in encoded into both the verbal and nonverbal cells in the matrix.

3. When more than one behaviour category occurs during the three second interval, the observer will record all behaviours. If no change occurs then the observer will repeat the previous category.

4. If an observer codes a 7 (criticism) and is satisfied that the criticism is meant to be helpful, or encouraging, he immediately codes a 2. This ground rule attempts to differentiate between helpful criticism ("a soft 7") and punitive criticism ("a hard 7"). Consequently in the analysis, a cluster of 7's followed by 2's would indicate a lot of encouraging correction.

5. If a teacher is participating in an activity (e.g. badminton) with a student or students, the observer will code a 13, that is a nonverbal

behaviour accepting the feelings and ideas of the learner.

6. In coding category 6, directions, the information giving part of the directions is coded as a 5 and the executive part of the statement is coded as a 6. For example, "Squad #1, on my command will move outside to the 50 yard line of the football field." - 5 "Ready go"! - 6.

7. While the coding of 8, 18, and 8\, and 18\, are predictable student responses the observer will distinguish between them by the level of cognition observed or required. If the verbal or nonverbal student response requires only knowledge and comprehension then an 8 or 18 is recorded. However, if the student response requires application, analysis, synthesis or evaluation, then an 8\, or 18\, is recorded.

8. Category 20, silence is usually reserved for the start and close of the class. Category 10, (confusion) usually occurs during the teaching action.

THE CATEGORIES OF CAFIAS

Categories	2 - 17	Teacher Behaviors
"	8 - 19	Student Behaviors
"	10	Confusion
"	20	Silence

Relevant Behaviors

Categories	Verbal	Nonverbal
2 - 12	2	12
	(A positive value assessment) Praises, commends, jokes, encourages.	Face: Smiles, nods with smile, (energetic) winks, laughs. Posture: Applause through clapping hands, congratulatory pats on shoulder, head, etc., rings student's hand, embraces joyfully, laughs to encourage.
3 - 13	3	13
	(No value implied) Accepts, clarifies, uses, and develops suggestions and feelings by the learner. N.B. Flanders category one which refers to teacher acceptance of student feeling and emotions is included in this category. Coders are reminded to use I and II on tally sheets. These behaviors are tallied separately for analysis purposes and included for parameter purposes in the matrix as 3 and 13	(Elevates student performance onto a par with teacher performance) Face: Nods without smiling, tilts head in empathetic reflection, sighs empathetically. Posture: Shakes hands, embraces sympathetically, places arm around shoulder or waist, catches an implement thrown by student, accepts facilitation from students, takes part in game with students, supports child during activity, spotting in gymnastics.
4 - 14	4	14
	Asks questions requiring student answer.	Face: Wrinkles brow, opens mouth, turns head with quizzical look. Posture: Places hands in air quizzically to expect answer, stares awaiting answer, scratches head, cups hand to ear, stands still half-turned toward person, awaits answer.

THE CATEGORIES OF CAFIAS (Continued)

Categories	Verbal		Nonverbal
5 - 15	5		15
	Gives facts, opinions, expresses ideas or asks rhetorical questions.	Face:	Whispers words inaudibly, sings or whistles.
		Posture:	Gesticulates, draws, writes, demonstrates activities, paints, points out facts on board.
6 - 16	6		16
	Gives directions or orders which will result in immediate observable student response.	Face:	Points with head, beckons with head, yells at using language other than recognizable words.
		Posture:	Points finger, blows whistle, holds body erect while barking commands, pushes a child in a given direction.
7 - 17	7		17
	(A negative value assessment.) Criticizes, expresses anger or distrust, sarcastic or extreme self-reference.	Face:	Grimaces, growls, frowns, drops head, throws head back in derisive laughter, rolls eyes, bites, spits, butts with head, shakes head.
		Posture:	Hits, pushes away, pinches, grapples with, pushes hands at student, drops hands at student, drops hands in disgust, bangs table, damages equipment, throws things down.
8 - 18	8		18
	Student response that is entirely predictable, such as obedience to orders and responses not requiring thinking beyond the comprehension phase or knowledge (after Bloom).	Face:	Poker-face response, nods, shakes, gives small grunts, quick smile.
		Posture:	Moves mechanically to questions or directions, responds to any action with minimal nervous activity, robot-like, practices drills, awaits in line, etc., student responds by putting hand up in answering to teacher direction.

THE CATEGORIES OF CAFIAS (Continued)

Categories	Verbal	Nonverbal
8\ - 18\	Eine (8\)	Eineteen (18\)
	Predictable student responses that require some measure of evaluation, synthesis, and interpretation from the student but must remain within the province of predictability. The initial behavior was in response to teacher initiation. Student interpretation from teacher in discussed activity. A student questioning when related strictly to topic under discussion.	Face: Look of thinking eyes, pensive formal expressions. Posture: Interprets movements, tries to show some arrangement that requires interpretive thinking; e.g., works on gymnastic routine; test taking; interpretation of task cards; all game playing. Student puts hands in air in order to give answer to teacher question.
9 - 19	9	19
	Pupil-initated talk that is purely the result of their own initiative and which could not be predicted (either positive or negative behavior).	Face: Makes interrupting sounds, gasps, sighs. Posture: Puts hands up in air to ask (unsolicited) question of teachers, gets up and walks around without provocation, begins creative movement education, makes up own games, makes up own movements, shows initiative in supportive movement, introduces new movements into games not predictable in the rules of the games.
10 - 20	10	20
	Stands for confusion, chaos, disorder, noise.	Face: Silence, children sitting doing nothing, noiselessly awaiting teacher just prior to teacher entry, etc.

Cheffers, J. T., Mancini, V. H. & Martinek, T. J. (1980). Interaction Analysis. Association for Productive Teachers, Minneapolis, Minn., pp. 22-24.

APPENDIX C

CAFIAS RATIOS AND PERCENTAGES

CAFIAS RATIOS AND PERCENTAGES

Cheffers' instrument produces some twenty-five ratios, and percentages, as shown in Table 1.

The data of the 10 experienced teachers, the 10 novice teachers, and the 10 trainee teachers were pooled to provide separate group Cheffers' matrices for between group comparisons. The Kruskal-Wallis Analysis of Variance for non-parametric data was used to test for statistical significance between the three groups on the CAFIAS Ratios and Percentages. (see Table 1).

Besides the CAFIAS ratios listed in Table 1, other verbal and nonverbal ratios and interaction data as suggested by Flanders (1970) were employed in the study. They are:

1. The I/D ratio which, indicated the relationship of indirect teacher influence (categories 1, 2, 3, 4) to direct teacher influence (categories 5, 6, 7). Below are the formulae for the calculation of the verbal and nonverbal and combined verbal and nonverbal aspects of this ratio.

   (1) verbal I/D $= \frac{2 + 3 + 4}{5 + 6 + 7}$

   (2) nonverbal I/D $= \frac{12 + 13 + 14}{15 + 16 + 17}$

Table 1

CAFIAS Ratios and Percentages

Key to CAFIAS Ratio Abbreviations		Suggested Numberical Calculations of CAFIAS Ratios	
TT V	Teacher verbal behaviour	TT V	Addition of Categories 2,3,4,5,6,7
NV	Teacher nonverbal behaviour	NV	Addition of Categories 12,13,14,15,16,17
Tot.	Total Teacher behaviour (verbal and nonverbal)	Tot.	Categories 2,12,3,13,4,14, 5,15,6,16,7,17
PTV	Pupil verbal behaviour	PTV	Addition of Categories 8,8 ,9
NV	Pupil nonverbal behaviour	NV	Addition of Categories 18,18 ,19
Tot.	Total pupil behaviour	Tot.	Categories 8,18,8 ,18 , 9,19
Con.	Confusion	Con.	Category 10
Sil.	Silence	Sil.	Category 20
Tot.	Total silence and confusion	Tot.	10 + 20
TQR V	Teacher question ratio verbal	TQR V	$\frac{4}{4 + 5}$
NV	Teacher question ratio nonverbal	NV	$\frac{14}{14 + 15}$
Tot.	Total teacher question ratio	Tot.	$\frac{4 + 14}{4+14+5+15}$
TRR V	Teacher response ratio verbal	TRR V	$\frac{2 + 3}{2 + 3 + 6 + 7}$
NV	Teacher response ratio nonverbal	NV	$\frac{12 + 13}{12 + 13 + 16 + 17}$
Tot.	Total teacher response ratio	Tot.	$\frac{2 + 12 + 3 + 13}{2+12+3+13+16+7+17}$
PIR V	Pupil initiation ratio-verbal behaviour	PIR V	$\frac{8 + 9}{8 + 8 + 9}$
NV	Pupil initiation ratio-nonverbal	NV	$\frac{18 + 19}{18 + 18 + 19}$
Tot.	Total pupil initiatio ratio	Tot.	$\frac{8 + 18 + 9 + 19}{8 + 18 + 8 + 18 + 9 + 19}$
CCR	Content cross	CCR	Total tallies in columns 4, 14,5,15, and the steady state cells just once.

T	Percentage of matrix where the teacher is doing the teaching.	P	Percentage of total tallies where the class was working in groups or as individuals
E	Percentage of matrix where the environment is doing the teaching	I	Percentage of time where the teacher was not influencing the class and where observational learning was not occurring.
S	Percentage of matrix where another student is doing the teaching.		
W	Percentage of total tallies where class spent time working as a whole class.		

*Cheffers, J. T. Mancini, V. H. & Martinek, T. J. (1980). Interaction Analysis, Association for Productive Teachers, Minneapolis, Minn., pp. 40-44.

(3) Total I/D $= \frac{2 + 12 + 3 + 13 + 4 + 14}{5 + 15 + 6 + 16 + 7 + 17}$

2. The i/d ratio, which omits the instructional behaviour of questioning and lecturing (categories 4 and 5), is calculated in order to determine the style of motivation and control in the classroom. The verbal aspect of this ratio is calculated by dividing the total number of tallies in columns 2, 3 by the total number of tallies in columns 6, 7. The nonverbal aspect is calculated by dividing the total number of tallies in columns 12, 13 by the total number of tallies in columns 16, 17. Following are the formulae for the calculation of the verbal, nonverbal and the combined verbal and onverbal aspects of the i/d ratio.

(1) verbal i/d $= \frac{2 + 3}{6 + 7}$

(2) nonverbal i/d $= \frac{12 + 13}{16 + 17}$

(3) total i/d $= \frac{2 + 12 + 3 + 13}{6 + 16 + 7 + 17}$

APPENDIX D

CAFIAS SAMPLE WORKSHEET

SAMPLE CAFIAS WORKSHEET

W001	- 20	200	21 - 4	40	41 - (5)	350	61 - 18\	111	81 - 18	181
02	- 5	50	22 - 9	91	42 - (5)	350	P62 - 18\	111	82 - (5)	350
03	- (5)	350	23 - 9	91	43 - (5)	350	63 - 18\	111	83 - (5)	350
04	- 6	60	24 - 4	40	44 - (5)	350	64 - 18\	111	84 - (5)	350
05	- 18	181	25 - 9	91	45 - (5)	350	65 - 18\	111	85 - 19	190
06	- 16	160	26 - 5	50	46 - (5)	350	66 - 18\	111	86 - 19	191
07	- 6	60	27 - (5)	350	47 - (5)	350	67 - 18\	111	87 - 20	200
08	- 6e	62	28 - 5	50	48 - 4	40	68 - 18\	111	E88 - END	
09	- 18	181	29 - (5)	350	49 - 9	91	69 - 18\	111	89	
10	- 6e	62	30 - 18	181	50 - 2	20	70 - 18\	111	90	
11	- 18	181	31 - (5)	350	51 - 5	50	W71 - 6	60	91	
12	- 6e	62	32 - 9	91	52 - (5)	350	72 - 18	181	92	
13	- 18	181	33 - 7	70	53 - (5)	350	73 - 18	181	93	
14	- 6e	62	34 - 7	70	54 - (5)	350	74 - 18	181	94	
15	- 18	181	35 - 16	160	55 - (5)	350	75 - 15	150	95	
16	- 6e	62	36 - 6	60	56 - (5)	350	76 - 18	181	96	
17	- 18	181	37 - 18	181	57 - 9	91	77 - 18	181	97	
18	- 6e	62	38 - 6	60	58 - 2	20	78 - 18	181	98	
19	- 18	181	39 - 18	181	59 - 9	91	79 - 15	150	99	
20	- 6	60	40 - (6)	360	60 - (5)	350	80 - 18	181	100	

N = 87

W	01	P	62	W	71	END	N + 1
2	1	1	62	2	71	4	88

Cheffers, J. T., Mancini, V. H. & Martinek, T. J. (1980). Interaction Analysis, Association for Productive Teachers, Minneapolis, Minn., p. 49.

APPENDIX E

CAFIAS KEY(S) FOR ENCODING DATA

CAFIAS KEY FOR ENCODING DATA

Observed Behaviour Category	Punch Code	Code If Circled	Row or Column of Matrix	Observed Behaviour Category	Punch Code	Code If Circled	Row or Column of Matrix
2	20	320	1	7	70	370	31
2s	21	321	2	7s	70	370	31
2e	22	322	3	7e	72	372	33
12	120		4	17	170		34
12s	121		5	17s	171		35
12e	122		6	17e	172		36
3	30	330	7	8	80	380	37
3s	31	331	8	8s	81	381	38
3e	31	332	9	8e	82	382	39
13	130		10	18	180		40
13s	131		11	18s	181		41
13e	132		12	18e	182		42
4	40	340	13	8	10	310	43
4s	41	341	14	8 s	11	311	44
4e	42	342	15	8 e	12	312	45
14	140		16	18	110		46
14s	141		17	18 s	111		47
14e	142		18	18 e	112		48
5	50	350	19	9	90	390	49
5s	51	351	20	9s	91	391	50
5e	52	352	21	9e	92	392	51
15	150		22	19	190		52
15s	151		23	19s	191		53
15e	152		24	19e	192		54
6	60	360	25	10	100	300	55
6s	61	361	26	10s	101	301	56
6e	62	362	27	10e	102	302	57
16	160		28	20	200		58
16s	161		29	20s	201		59
16e	162		30	20e	202		60

P = 1 W = 2 I = 3 End = 4

Cheffers, J. T., Mancini, V. H., & Martinek, T. J. (1980). Interaction Analysis, Association for Productive Teachers, Minneapolis, Minn., p. 164.

APPENDIX F

INTER OBSERVER

RELIABILITY STUDY

Inter Observer Reliability Study

Cheffers (1980) recommends Kendall's W, a coefficient of concordance, for determining inter observer reliability. This formula is used when more than one observer is tested, and has the added benefit of accommodating any tied rankings within groups. The following procedures were followed in order to calculate Kendall's W.:

1) The investigator coded a lesson which had been recorded on videotape and entered the top ten frequency cells percentages for that specific lesson into a table. (see Table 1, Column "A")

2) Two outside observers coded the same lesson, and the top ten cells from these respective rankings were also set out in Table 1. (coders "B" and "C").

3) Once "Σd^2" was established for the top ten rankings, calculations were undertaken to determine "W", as per the Kendall formula.

Kendall's W was found to be .91, and is significant at or beyond the .01 level of significance. Flanders (1970) maintains that any finding over .75 is acceptable, with .85 as the target range for this type of research. Therefore, the inter observer reliability is acceptable for the purpose of this study.

Table 1

Reliability Study Using Kendall's W. Coefficient of Concordance

	Coders (K)				
Cells (n)	A	B	C	d^2	
5-5	1	1	1	$(3-16.5)^2$	= 182.25
6-8	2	2	2	$(6-16.5)^2$	= 110.25
8\-10	3.5	3.5	3	$(10-16.5)^2$	= 42.25
10-8\	3.5	3.5	4	$(11-16.5)^2$	= 30.25
8-6	5	5	6	$(16-16.5)^2$	= 00.25
5-6	6.5	6	7.5	$(20-16.5)^2$	= 12.25
6-6	6.5	10	5	$(21.5-16.5)^2$	= 25.00
9-10	8	7	7.5	$(22.5-16.5)^2$	= 36.00
10-9	9.5	8	9.5	$(27-16.5)^2$	= 110.25
8-10	9.5	9	9.5	$(28-16.5)^2$	= 132.25
				$\sum d^2$	= 681
K = 3					
n = 10				W	= .91

From Büning & Trenkler (1978), p. 225.

APPENDIX G

INTRA OBSERVER RELIABILITY STUDY

Intra Observer Reliability Study

Cheffers (1980) states that Kendall's Tau is the preferential means of establishing intra observer reliability. The following procedures were followed in order to calculate Kendall's Tau:

1) The investigator coded one of the sample videotaped lessons on four separate occasions over an eight day period. The top ten cells from the initial coding were put into a table and ranked 1-10. (Table 1). Each succeeding coded trial of the sample lesson was listed on the same table (rows 2, 3 and 4) in order to compare rankings.

2) The total (S) for each ranking was determined in accordance with Kendall's formula. The Tau calculations were then determined and found to be: 1.0; .86; .91; 1.0.

These findings are significant at or beyond the .01 level of signifance and therefore represent acceptable results for intra observer reliability.

Table 1

Coding Reliability of the Investigator Using Kendall's Tau

Subject L8
n = 10

		Coding Trials (1)	(2)	(3)	(4)
Top Ten Cells	5-5	1	1	1	1
	8\-8\	2	2	2	2
	3-8\	3	3	4	3
	8\-3	4	4	3	4
	10-10	5	5	5	5
	5-6	6	7	6	6
	6-18	7	6	7	7
	10-5	8	10	8	8
	2-5	9	8	10	9
	7-2	10	9	9	10
Total	(=S)	45	39	41	45
Tau		1.0	.86	.91	1.0

From Büning & Trenkler (1978), p 262.

APPENDIX H

INTERPRETING PARENT CELL MATRICES

Interpreting the Parent Cell Matrix

Cheffers (1980) describes the format utilized for determining both primary and secondary interaction patterns based on data produced in the parent cell matrices. The following procedures are employed:

1. The cell in the matrix with the greatest frequency is circled. This is the starting point. In the example, it is the 5-5 cell.

2. The next step is to locate the event which is most likely to follow. This is done by inspecting the row (horizontally) which is designated by the second number in the address of the starting cell. Place a circle around the cell with the greatest frequency in that row. In the example it is the 5-6 cell.

3. Write down the column number (vertical) of that cell. It is column 6 in the example. Proceed to the steady state cell for that category (6-6).

4. Repeat the process until a section of the matrix is enclosed, or until a teacher→student→teacher transaction has been completed.

5. The secondary patterns are calculated by repeating the above described process, beginning with the next highest frequency cell, in the matrix, that has not been circled.

The instructional pattern derived from the matrices produces a flow pattern. By following this pattern, conclusions regarding the sequence of events in the lesson can be made. Table 1 illustrates a sample matrix and flow pattern, in this case a 5-5-6-8-5 pattern. (Information giving, followed by direction, followed by predictable student response, followed by information giving).

A detailed account of this procedure can be found in Cheffers' (1980) interaction handbook.

Table 1

Sample Parent Cell Matrix (to determine Interaction Patterns)

CAFIAS CATEGORIES	2	3	4	5	6	7	8	8\	9	10
2	1.01	1.18	.12	1.87	.46	.18	.12	.85	.14	--
3	--	1.08	1.12	.51	.54	--	--	3.61	.31	--
4	--	--	.33	1.42	.10	.13	.88	.46	.34	--
5	.55	.45	1.08	12.56	7.87	1.08	.63	1.31	.43	--
6	.65	.56	.26	1.59	.89	1.56	6.33	.96	.14	.39
7	.96	--	.21	.90	.55	1.00	1.12	--	--	.10
8	.24	.13	.35	1.83	1.80	.22	1.55	1.82	1.22	.67
8\	2.36	2.89	.32	1.59	1.62	.33	00	10.23	.20	.79
9	--	.58	.10	.53	.18	.13	--	--	.50	1.64
10	.10	--	--	.84	.20	.20	.27	.72	.99	.92

(12.56) - Starting Point

APPENDIX I

PERMISSION TO USE CAFIAS

APPENDIX J

SAMPLE PERMISSION LETTERS

VITA AUCTORIS

Kenneth Vern Stenlund received his Bachelor of Arts and Bachelor of Education degrees from the University of Western Ontario, London, Ontario. Since 1986 he has lectured at the Faculty of Education, University of Windsor, in the physical and health education section.

Mr. Stenlund belongs to several professional organizations related to physical education, including the Ontario Physical and Health Education Association (OPHEA), the Canadian Association of Health, Physical Education and Recreation (CAHPER) and the Association Internationale Des Ecoles Superieures D'Education Physique (AIESEP).