RELATIONSHIP BETWEEN RANK AND INSTRUCTOR TEACHING TECHNIQUE
IN AN ADULT MARTIAL ARTS SETTING

by

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(Under the Direction of Bryan McCullick)

ABSTRACT

The purpose of this study was to relate martial arts instructors’ behavior with their rank. Instructors were video recorded teaching a martial arts class and put into one of three groups: Low (1st degree black belt), Mid (2nd-3rd degree black belt), or High (3rd-5th degree black belt). Videos were analyzed using academic learning time-physical education and Cheffers’ Adaptation to Flanders’ Interaction Analysis System. Instructors in the High group displayed behaviors consistent with more experienced teachers, whereas those in the Low group displayed behaviors consistent with less experienced teachers. Those in the Mid group had behaviors consistent of teachers at a level of development between Low and High ranked instructors. This confirms the hypothesis that there is a positive relationship between rank and instructor behaviors expected to result in better student performance.
INDEX WORDS: Interaction, CAFIAS, ALT-PE, teaching, pedagogy, karate, Kyuki-Do, systematic observation, expertise
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CHAPTER 1

INTRODUCTION

Statement of Problem

The martial arts industry represents over $4 billion in trade a year, and has grown more than 5% in the past 5 years (IBIS World, 2018). More than 72,000 people are employed in over 67,000 related businesses throughout the United States. In 2014, there were 3.7 million participants age six and over. No data exists on how many people in the United States have ever participated in martial arts, but anecdotal evidence suggests it is a sizable minority. This reflects a large number of people who act as students and as instructors in a martial arts setting.

Martial arts can be classified as Asian and non-Asian. Asian martial arts include karate, tae kwon do, judo, aikido, and hundreds of others which make up the stereotypical image of martial arts. Non-Asian martial arts include fencing, boxing, Savate, and similar disciplines, which will not be considered further in this study. Asian martial arts developed in response to numerous cultural and historical events. Most modern Asian martial arts can be traced to the end of the 19th century, when schools began to be formalized and styles or lineages established. Although initially designed for military purposes, martial arts evolved to serve a role in civilian self-defense and ultimately in sport and personal development (Foster, 1997; Donohue, 2005).
The development of martial arts has led to hundreds of organizations representing dozens of different styles of martial arts. For example, from Yoshukai karate, itself an offshoot of Chito-Ryu karate, there are the following organizations: United States Yoshukai Karate Association, World Yoshukai Karate Kobudo Organization, Yoshukai International, Yoshukai Karate International, Yoshukan Karate Association, and several smaller organizations of less than a half dozen schools. As such, there is no central governing body for martial arts, even for individual styles such as karate or judo. Even sports which are recognized by the Olympics, such as judo, have numerous organizations. Judo has 6 different organizations in the United States. This decentralization of authority in martial arts has disadvantages when it comes to instructor training. There is not a systematized method for training new instructors, evaluating existing instructors, or quantifying student learning outcomes.

Numerous organizations have attempted to provide instructor training and certification. Large organizations, such as the United States Tae Kwon Do Alliance, as well as small organizations, such as the American Kyuki-Do Federation, provide instructor training to develop prospective and existing instructors within a specific style. Groups that offer instructor certification regardless of the martial arts organization to which the instructor belongs do exist, but none of them have external authority (such as by an accrediting agency) to do so. The majority of the certifications are also offered without validating the instructor’s teaching skill or credentials- they merely require a payment to be sent to be certified. Without an external authority to check the certification process of any of these organizations, there is no quality control. This lack of quality control can lead to individuals being ‘certified’, but this is a meaningless designation.
Because of the lack of a centralized organization to teach and certify teachers, most martial arts instructors learned to teach through the apprenticeship of observation (Schempp, 1989). New instructors are usually identified as talented or energetic students as they progress through the ranks (Czarnecka, 2001). These students are given teaching responsibilities for lower ranked students, presumably acquiring experience in teaching in the process. As students progress in rank, they gain greater responsibility and authority, eventually being able to run an entire class for the duration of a teaching period, usually 1-2 hours. Virtually no schools provide formal training during these instructional experiences (Czarnecka, 2001). As such, most martial arts instructors have no formal understanding of pedagogy and often have pedagogical techniques which are limited in scope and effectiveness. Learning through the apprenticeship of observation may lead to poor pedagogical techniques by the instructor, and propagation of bad pedagogical techniques through ‘generations’ of instructor-to-student transmission (Czarnecka, 2001).

Asian martial arts have two ways individuals are acknowledged in their skill progression. One is through the rank system, where students progress through a variety of ranks as they learn the material. Most styles have a curriculum where students learn specific skills (certain kicks, blocks, etc.) at each rank. Although the exact progression differs by style and organization, most use a progression from white belt, through a series of colored belts including yellow, orange, blue, green, and/or brown, to black belt. The duration spent in each rank also differs, but typically ranges from 3-6 months. In most styles, a dedicated student can earn a black belt in 3-5 years. Once the rank of black belt is attained, a new progression begins. Most styles have 10 degrees of black belt. In most organizations, the student must train in their current rank for a number of years equal to
the degree to which they will next advanced. For example, a second degree black belt must train for at least three years to progress to a third degree black belt. In many organizations, attaining a rank of fifth or sixth degree black belt is when a student is addressed by the title “Master”, and usually represents more than 20 years of continuous training.

The other progression is through the instructor route, where students may be elevated to assistant instructor, then instructor, senior instructor, head instructor, and similar titles as they gain experience and authority. These are not necessarily associated with a certain belt rank. Some schools allow color belt rank students to hold instructor positions, others require a black belt, and some require a third degree black belt rank. Although those in instructor roles have more opportunities to teach and experience, they are not necessarily instructed in how to teach effectively.

**Classroom Observation Systems**

Teacher behavior impacts student learning (Berliner, 1975). Teachers can influence how students interact with and learn the content. Studies conducted in physical education settings indicate that teachers spend more time in management and less time instructing than they believe (O’Brien, 1985). Behavioral observation systems attempt to quantify student behavior, teacher behavior, and student-teacher interactions (van der Mars, 1989). These data are helpful for determining what, exactly, is occurring in the practice space and how that may affect student learning. Non-systematic observation systems include the eyeball technique, checklists, and rating scales. These non-systematic methods are typically easy to do, but are subject to significant bias in data.
collection and analysis. For example, the eyeball technique is often influenced by the halo effect, whereby other behaviors of a teacher—such as them being positive and well-liked—affect how the observer interprets the teacher’s behavior.

Systematic observation methods attempt to minimize bias, but require more time and expertise to use (van der Mars, 1989). Appropriate training is essential to ensure appropriate reliability and validity in the data obtained. Observation systems may be quantitative—where numerical data attempts to explain what is happening, such as how many minutes students spend waiting—or qualitative—where text data attempts to explain why events are happening, such as why the instructor manages the class so that the student waits. Within quantitative systems, Cheffers’ Adaptation of Flanders’ Interaction Analysis System (CAFIAS) attempts to describe interaction patterns between the teacher and students. The Academic Learning Time-Physical Education (ALE-PE) attempts to quantify the amount of time students spend engaged in various activities during a class.

The CAFIAS is a system where an observer records what the teacher and student behaviors are in an ongoing fashion. The observer records behavior whenever it changes or every six seconds, whichever comes first. Therefore, if a teacher is lecturing for 12 seconds, it is recorded as two instances of lecturing. If the teacher lectures for five seconds and then a student interrupts with a question, it is recorded as one instance of lecturing and one instance of student-initiated question. The CAFIAS includes categories for verbal and non-verbal behaviors by either the teacher or the students. Data analysis includes reporting of simple percentages—how many behaviors of a certain type occur in a lesson—as well as interaction analysis—what the most common patterns of teacher-
student interactions are. The CAFIAS has a bias towards teacher behavior, and quantifies interactions, but is not as good about describing what, exactly, students are doing.

The ALT-PE is based on the theory that academic learning time—how much time students spend actually learning a concept—predicts student knowledge acquisition. The observer selects three students and then records what one student is doing during a six second span, then records the next student, then the third, and rotates back to the first. Each student behavior is quantified according to a series of levels, ultimately culminating in the student engaged in a motor-appropriate task, which as a percentage of time is the ALT-PE. The ALT-PE quantifies how much time students spend doing various tasks and behaviors, but does not describe the interaction between the teacher and the students.

The relationship between ALT-PE and martial arts skill acquisition has been demonstrated (Ko, 1986). In that study, a single instructor taught 61 students in two different Tae Kwon Do classes. Each student was taught three different martial arts skills: front kick, double punch, and movement in a stance. Their performance in the skills was recorded and graded by experienced, blinded observers and related to the ALT-PE calculated from recordings of the classes during which they were taught the skills. A significant relationship was found, confirming that the ALT-PE is an appropriate tool to measure student skill acquisition in martial arts.

Systematic observation methods have been used and described in a martial arts setting. Weise (1995) videotaped two instructors, each teaching one of three one-hour lessons: to adult mixed-rank students, youth beginning students, and youth mixed-rank students. Two 20-minute samples (from adult mixed-rank and youth beginning classes) were analyzed. A 10-minute sample from the youth mixed-rank class was used as
training. A modification of the Classroom Observation Record (COR), which is a checklist of behaviors engaged in by the teacher, was used. The COR is completed for an individual instructional theme—usually there are five to seven in each class period. The results of the observations were not reported, since the purpose of the study was to establish reliability and construct validity for the modified COR.

Vertonghen, Theebom, and Cloes (2012) studied five teachers of aikido, five of kickboxing, and 10 of karate. Each instructor had an interview before a class period, were observed and videotaped during a class period, and had an interview and questionnaire given after the class period. The questionnaire was the Teaching Approach to Martial Arts (TAMA) and consisted of seven questions with five levels ranging from traditional to efficient (or sport). The TAMA results were explained in the context of the interviews and observation, which confirmed that the TAMA was measuring what it intended to measure. The purpose of the TAMA was to identify classes and styles as traditional, education, or efficient/sport.

No study has applied systematic observation to compare the experience of the instructor, as determined by their martial arts rank, on instructional behaviors.

**Purpose of Study**

Since rank is correlated with duration of practice as a martial artist, it is often assumed that those of higher rank are more competent in both martial arts and teaching ability than those of lower rank. Although this is often true, it is not necessarily true. In this study, all of the subjects were instructors of at least first degree black belt rank. If
there is a difference in teaching technique between those of lower, middle, and higher rank, an association between rank and teaching technique can be drawn.

The purpose of this study was to relate martial arts instructor’s behavior with their rank. Specifically, this study addresses the following research questions:

1. What are the relationships between CAFIAS and ALT-PE?
2. What differences exist among instructors of low, middle, and high rank?
3. What differences exists between classes taught primary with partners versus those taught without partners?
CHAPTER 2

REVIEW OF THE LITERATURE

Since rank is correlated with duration of practice as a martial artist, it is often assumed that those of higher rank, who have been learning and teaching martial arts for a longer number of years, are more competent in both the performance and teaching of martial arts than those of lower rank. The purpose of this study was to relate martial arts instructor’s behavior with their rank. The methods used to measure instructor behavior were Cheffers’ Adaptation of Flanders’ Interaction Analysis (CAFIAS) and Academic Learning Time- Physical Education (ALT-PE). This chapter provides background knowledge through a literature review of systematic observation and each observation system used in this study.

Systematic Observation

Observation is used in instructional settings to provide data about teacher and student behaviors. Attitudes, feelings, and ideas are documented only insofar as they affect behavior. In this way, observation embraces the principles of behaviorism, taking a functional perspective on human activities. Observation can be unsystematic or systematic. Unsystematic observation might involve a series of steps- apparently a system. However, unsystematic observation is subject to numerous biases which can
affect the data recorded during the observation. Humans are subject to almost innumerable cognitive biases which alter their perception of reality. This is encapsulated by the post-positivist philosophical perspective, which states that while an objective reality exists, it is unlikely we will ever know what it truly is due to our numerous cognitive biases. Common biases which may result in data from unsystematic observations being inconsistent with reality include fundamental attribution error, confirmation bias, belief bias, and recall bias. Unsystematic observations include the eyeball technique—where an observer merely records what they believe is important during an observation—and rating scales and checklists—where an observer provides their own assessment of an individual’s performance or behaviors.

Systematic observation seeks to minimize cognitive biases to produce data which is more consistent with reality. Systematic observation methods acknowledge that biases still exist which may affect the data, but mechanisms are put in place to minimize and, when possible, quantify the amount of bias through statistical analysis. Data collected in as objective a method as possible are both most useful to teachers and supervisors (Zepeda, 2012) as well as researchers (van der Mars, 1989). Systematic observation is therefore highly valuable for teachers, supervisors, and researchers. Data from systematic observation has less bias, and therefore more generalizability, than data from unsystematic observation methods. Many unsystematic observation systems also suffer from including analysis with the observation. That is, a value assessment is made about a behavior, such as “The teacher inappropriately criticized a student” (Zepeda, 2012). Systematic observation systems focus on solely collecting and reporting data, leaving analysis and evaluation to a later, discrete step (van der Mars, 1989). Systematic
observation was first used in classroom settings, but was quickly embraced by sports pedagogy experts as a useful tool in physical education (Bain, 1996).

Systematic observation can be quantitative or qualitative. Quantitative observation relies on counting observable features of a lesson. Qualitative observation relies on rich textual description of observable features of a lesson. Interviews, text analysis, and similar methods can provide further data for qualitative observations. Quantitative observation systems are often categorized by the time frame in which behaviors are measured. In event recording, data are tracked as each time an event occurs, regardless of the duration of the event. This captures every instance of a behavior, which may not be useful if the behavior is “student dribbles a basketball.” Duration recording collects data on the amount of time a behavior is demonstrated. Duration recording is useful for single behaviors, but becomes unwieldy when there are multiple behaviors or subjects being observed. With interval recording, the class is observed for a set amount of time, then data is recorded for a set amount of time, and this pattern repeats continuously. This allows recording of a variety of different behaviors. The interval recording method is used for both systems included in this study.

Systematic observations are superior to unsystematic observations because they have greater validity and reliability, since they reduce the effects cognitive biases produce on the collected data. Validity is the concept suggesting that certain behaviors are associated with a certain outcome. For any observation system to be a useful tool, the validity for the system to document a change in student outcomes is necessary. Validity can be divided into content validity, criterion validity, and construct validity. Content validity is established by experts providing an opinion on the validity of the test or
components of the test. Criterion validity is established through the relationship with other established measurements (concurrent validity) or the relationship with student outcome (predictive validity). Construct validity can be established by comparing different groups who have the construct (e.g. experts vs. notices) or conducting an intervention, where the construct is taught and then pre- and post-testing is conducted to determine if the subjects had a change in the construct.

**Cheffers’ Adaptation of Flanders' Interaction Analysis System (CAFIAS)**

In 1970, Flanders proposed an interaction analysis system whereby teacher and student verbal behaviors were coded (Flanders, 1970). This system recorded behaviors every 3 seconds, or whenever the behavior changed. This system lacked codes for physical behaviors. In 1980, Cheffers’ designed an adaptation to Flanders’ system which included codes for physical behavior (Cheffers, Mancini, & Martinek, 1980). The Cheffers’ Adaptation of Flanders’ Interaction Analysis System (CAFIAS) has 20 categories, composed of 12 categories for teacher behaviors and 8 for student behaviors. The CAFIAS is an interval recording system where the current activity is recorded every 3 seconds or if there is a change in behavior. Analysis of the results of CAFIAS produces not only the ratio of behaviors, but also the patterns of behavior. The hypothesis is that certain behaviors and patterns of behavior result in superior student learning (Silverman & Buschner, 1990). CAFIAS has been validated in several studies and has been used to change teacher and coach behavior and has been used to compare teachers in a variety of settings.
The CAFIAS has been subject to predictive validity, where certain values on the CAFIAS predict student achievement, as well as concurrent validity, where the CAFIAS has correlation with other measures predictive of student or athlete achievement. Construct validity has been determined in numerous studies using the intervention method.

Predictive validity was established in a study where students were taught a serve and a forearm pass in volleyball (Silverman & Buschner, 1990). No significant relationship between behaviors and the forearm pass were found. For the serve, teacher acceptance of student responses, teacher talk to a smaller group of students, student predictable physical response, and student-initiated questions were associated with better student performance. Numerous behavior chains, such as teacher praise followed by student predictable physical response, teacher talk to a smaller group of students followed by student-initiated question, and student predictable physical response followed by teacher question, were also associated with better student performance. This study establishes the utility of using certain CAFIAS behaviors to predict student improvement when taught a volleyball serve. Extrapolating these results to other sports and settings may warrant caution, as they have not been repeatedly demonstrated in a wide variety of contexts.

Concurrent validity has been established in several studies involving CAFIAS. Coaches who were considered to be more successful, according to their performance on the Coaches’ Performance Criteria Questionnaire, used more praise and acceptance of student behavior (Rotsko, 1979). In a study comparing team climate in high school basketball teams and CAFIAS scores of coaches, satisfied teams had coaches who did
more nonverbal and verbal praise and acceptance (Fisher, Mancini, Hersch, Prouix, & Staurowsky, 1982). In a study of 22 expert Ladies Professional Golf Association instructors teaching athletic undergraduate female students a first lesson in golf, over half of the behaviors were instructional and there was a significant relationship between student-initiated behaviors and acceptance of student behaviors (Schempp et al., 2004). These studies together demonstrate that there are behaviors which more experienced or expert coaches engage in, which provides concurrent validity for the CAFIAS.

Usefulness of the CAFIAS as a tool to effect behavior change has been demonstrated. In a systematic review of eight studies including 210 preservice teachers, teachers were assigned to feedback given in a standard fashion versus standard feedback plus feedback in the context of a CAFIAS analysis (Mancini, Wuest, & van der Mars, 1985). Those teachers assigned to the CAFIAS-based feedback did more praise and acceptance of students and questioning of students, provided more information with less direction and criticism, and had more student contribution. One to four years after the studies had been done, these teachers were followed up and evaluated. Teachers assigned to CAFIAS-based feedback had students with almost twice the academic learning time-physical education (ALT-PE) as teachers who received only standard feedback. Receiving feedback in the context of the CAFIAS has also improved teacher burnout. One study took six high burnout teachers and gave three of them traditional coaching and feedback and three of them traditional coaching as well as providing them CAFIAS and ALT-PE training. The CAFIAS, ALT-PE, and burnout were measured before and after feedback. In those teachers who received the training, there was more interaction with students more information, praise, acceptance and less direction and criticism and
burnout scores (Mancini, Wuest, Vantine, & Clark, 1984). Even in the context of a single individual, training in CAFIAS can be powerful. One study used a single field hockey coach who was recorded, then received feedback including CAFIAS training, then recorded again immediately and a year later. Praise, information-giving, and direction-giving increased and criticism decreased, and the behaviors showed a small but further change one year later (Mancini, Clark, & Wuest, 1987). It is evident that training teachers in how to use the CAFIAS affects their behavior. Use and understanding of a systematic system of observation is superior to typical feedback given qualitatively and without a systematic system to change student behaviors to those consistent with what are expected to improve student performance.

Finally, the CAFIAS is a valuable tool for comparing teachers. In a comparison of physical education teachers’ fitness level and behaviors during class, nine male and nine female teachers were recorded during the first and last period of each day on Monday and Friday for four weeks. High fitness teachers spent less time asking questions and more time giving directions than low fitness teachers (Bishoff, Plowman, & Lindenman, 1988). In a study of Korean physical education teachers, five each at the elementary, middle, and high school levels, there was more teacher contribution by the middle school teachers and more praise and acceptance by the elementary school teachers (Yu & Kim, 2010). The amount of time given to teachers to plan also has an effect on their behaviors. When six female and six male preservice physical education teachers were assigned to either have two minutes or one hour to plan a lesson, teachers who had a longer planning time gave more directions and had less silence (Imwold, Rider, Twardy,
Oliver, & Griffin, 1984). Different teachers engage in different behaviors, and these differences are effectively captured using the CAFIAS.

The CAFIAS has shown validity as a system to document teacher and student behaviors and achievement. The CAFIAS can be used to document changes in behavior over time in teachers, such as those instructed in how to use the CAFIAS. The CAFIAS is also effective at distinguishing different teachers. This last quality is particularly important for the work described here, as comparing different teachers is the focus of this research.

**Academic Learning Time – Physical Education**

The time students spend in an educational context can be divided into three segments: the amount of time they are physically present, the amount of time they spend engaging in an activity, and the amount of time they spend engaging in an appropriately challenging activity. The latter item is the academic learning time (ALT), and was a key finding of the Beginning Teacher Evaluation Study (BTES; Berliner, 1975). The BTES studied children in grades 2 and 5 engaging in reading and mathematics activities. Student changes in scores over time were used to stratify classrooms into relatively higher achieving and lower achieving groups. From there, researchers observed the classrooms to identify differences between them. One of the more consistent and important differences observed was “students are engaged” (Berliner, 1975). Subsequent work indicated that students engaged in appropriately challenging tasks had the greatest achievement. Extrapolation to physical activity led to the development of the Academic
Learning Time- Physical Education (ALT-PE) which was theorized to correlate with student achievement.

The ALT-PE is an interval recording system whereby several students are selected at random in a class. The observer then watches a selected student, records that student’s behavior, then observes the next student, etc. Student behaviors are classified as pacing, content-general, content-physical education, engagement, and difficulty. The ALT-PE is calculated as the percentage of intervals where the student was participating in content-physical education, motor engaged, and appropriate difficulty. The ALT-PE has evolved over several iterations since its inception, with refinement of the definitions of categories occurring at each step (Rife, Shute, & Dodds, 1985; Metzler, 1989). The ALT-PE has been used in many studies, and its validity, ability to effect and document behavior change, and ability to compare teachers has been well documented.

The ALT-PE has been subject to predictive validity, where certain values predict student achievement. Construct validity has been determined using the intervention method and the different groups method.

The association of ALT-PE directly with student improvement is a demonstration of predictive validity. With 15 undergraduate students in an elective martial arts physical education class, objective assessment of three different skills was made in a blinded fashion by observation of video recordings. The ALT-PE was calculated for ten weeks of instruction and was found to correlate positively with improvement in martial arts skills (Ko, 1986).

The style of teaching and amount of ALT-PE provided has been studied to establish the construct validity of ALT-PE, whereby differences predicted by the
assignment to different groups were successfully demonstrated. Thirty-six children were randomized to receive instruction involving a high amount of ALT-PE, a low amount of ALT-PE, and no ALT-PE in using a badminton racket to dribble the shuttle. Those students in the high amount of ALT-PE group had significantly higher scores than students in the other two groups. There was also a significant relationship between ALT-PE and post test scores ($P<0.05$, $R=0.59$). Thirty elementary students were randomized into three groups with different teaching styles: command, practice, and reciprocal. Students in the practice group, as predicted, had higher ALT-PE than students in the other two groups (Munusturlar, Mirzeoglu, & Mirzeoglu, 2014). When applied to athletes, the ALT-PE has been shown to be able to discriminate between college-level starting and non-starting football players (Shaffner, 1986).

Numerous studies have been conducted investigating the effects of teacher training on ALT-PE. Four elementary school teachers engaged in an intervention aimed at reducing managerial and transition time, increase practice time, and provide high rates of engagement at an appropriate skill level (Hart, 1983). The ALT-PE was measured before and after interventions, which were personalized and included short instructional clinics and daily feedback on performance. The ALT-PE increased for all teachers after the intervention, demonstrating that the ALT-PE is changeable with modifying teacher behaviors. Another study with 30 junior high school physical education teachers divided them into two groups: one which received training on the ALT-PE and one which receives traditional feedback. The group which received training had students with significantly higher ALT-PE scores than the control group (O’Brien, 1985). Furthermore, the teachers in the treatment group were able to more accurately predict the amount of time spent on
various class activities. Thirteen teachers at a variety of student levels were randomized to receive training in ALT-PE or a control group. Those teachers in the treatment group demonstrated higher ALT-PE than those in the control group (43% vs 30%; Randall & Imwold, 1989). When evaluating the change behavior in a single teacher, providing education to that teacher in the form of feedback about their ALT-PE increased the students’ ALT-PE from 17% to 42% (Walker, 1990).

Finally, the ALT-PE is a valuable tool for comparing teachers. Three high school physical education teachers were observed using the ALT-PE as well as observation of teacher behaviors. One teacher had a higher ALT-PE and regularly engaged with students whereas the teachers with lower ALT-PE spent time in an observe-officiate role (Hastie, 1994). In another study of 9 junior high school physical education teachers, the teacher behaviors of pre-instruction and management predicted 59% of the variability in ALT-PE. This relationship is opposite the expected direction with effective teaching, and implies that these teachers were not using effective teaching strategies (LaMaster & Lacy, 1993). Specialist and non-specialist teachers of physical education did not differ in their ALT-PE, but did differ in specific activities, where specialists tended to focus on skill development and non-specialists spent more time in game play (Placek & Randall, 1986). Pre-service (n=26) and in-service (n=28) physical education teachers were observed and ALT-PE was scored for each. Although there was no difference in ALT-PE, certain other domains, such as management, were higher with pre-service teachers than with in-service teachers (Yildirim, 2003).

The ALT-PE has shown validity as a system to document teacher and student behaviors and achievement. The ALT-PE can be used to document changes in behavior
over time in teachers, such as those instructed in how to use ALT-PE. ALT-PE is also effective at distinguishing different teachers, similar to the CAFIAS.

**Summary**

Systematic observation systems provide a valid, reliable tool for documenting teacher and student behaviors which are predictive of student achievement. Systematic observations are superior to unsystematic observations because the observations are more reliable and valid. Criterion and construct validity have been established for the CAFIAS and the ALT-PE, and both have been used to document differences among instructors. Documenting validity is an ongoing process, and comparing the two tools with each other will provide further evidence for the validity of each (Coach, Gable, & Madura 2013). Each tool measures a different domain— the CAFIAS measures interaction and the ALT-PE measures time spent by students on certain tasks. Use of both tools will help create a rich data set for analysis within this study.
CHAPTER 3

METHODS

Since rank is correlated with duration of practice as a martial artist, it is often assumed that those of higher rank, who have been learning and teaching martial arts for a longer number of years, are more competent in both the performance and teaching of martial arts than those of lower rank. The purpose of this study was to relate martial arts instructor’s behavior with their rank. This chapter describes the context and setting of the research, participant recruitment, data collection, and statistical analysis.

Context

The setting for this study is two martial arts schools located in an urban area in the southeastern United States. One is a non-commercial, martial arts school owned as a side hobby by the owner and not a source of income for the owner. The other is a professional commercial martial arts school which is the primary source of income for the owner. The non-commercial school, AYK, is located at the head instructor and lead author’s primary residence. There is a dedicated 1000 square foot addition to the back of the house with mirrors and hardwood floors. An additional 500 square foot room in the basement with mirrors and plastic floors is also used. Karate is taught three days a week. In addition to karate, classes in hapkido, kobudo, and Kyuki-Do are offered weekly. The students are
all adults over the age of 18. Class sizes range from one to 10 students with a median of four for Yoshukai and two for the other classes.

The commercial school, Acme Martial Arts, is located in a stand-alone commercial building shared with another business. There is an office, two bathrooms, two changing rooms, and a dedicated 1000 square foot room with padded mats and a 750 square foot area with a padded mat covering springs. Kyuki-Do is taught five days a week at multiple times each day. In addition to Kyuki-Do, classes in hapkido, aikido, and judo are offered. The students attending this school range in age from three years to elderly. Class sizes range from one to 30 students, with a median of 12 students for Kyuki-Do and five for the other classes.

Classes last for an hour and typically include a 10-20 minute warmup period and two or three training segments of 10-20 minutes’ duration. The warmup period includes dynamic and static stretching and calisthenics. The training segments consist of one instructor and one-20 students of a similar rank or level of ability. Each segment has a dedicated focus, such as kicks, forms, boxing drills, etc.

Participant Selection & Recruitment

The study was approved by the University of Georgia’s Institutional Review Board and informed consent was be obtained for all participants prior to study start. Participants were the teachers of the classes. The head instructors of Acme Martial Arts and AYK were asked to identify all of the active adult (18 years of age or older) black belts in their school and provided an email address for each black belt. Every active adult black belt in each school was then sent a recruitment email soliciting participation.
There were no exclusion criteria. Those individuals who volunteered replied to the email and were provided with an informed consent form to sign (Appendix B). Once informed consent was obtained, a time for the participant to teach their class was chosen by the participant. Participants were considered “Low” rank if they were ranked as a first-degree black belt, as “Middle” rank if they were ranked as a second degree black belt or a third degree black belt with less than 12 years of teaching martial arts, and as “High” rank if they were ranked as a third degree black belt with 12 or more years of teaching martial arts or a fourth-degree black belt or higher (Table 1).

For participants at AYK, a class period was identified where each would be the primary instructor. For participants at Acme Martial Arts, two settings were created. The first was a special workout class scheduled for a Sunday where each of three instructors would run a class for one hour. The second was two instructors who taught a typical class which was recorded. Participants were instructed to teach a typical forms class, which includes a variable warmup period and repetition of forms with regular feedback (Appendix A).

All participants had engaged in a certified instructor training (CIT) course held by both schools which were involved in this study. The CIT was either a weekend intensive or a weekly session, each composed of at least 8 hours of instruction in how to teach. Topics were characteristics of a great instructor, developing student rapport, basic class structure and warmup, teaching techniques, integrating a new student, and martial arts troubleshooting. Each session included a short practicum where the participants taught the rest of the group and received feedback on their performance.
Data Collection

A video and audio recording of each training segment was made. A camera was placed on a tripod facing at a 45-degree angle to the orientation of the students, directed towards the students but including the instructor in the frame. Recording began immediately before students bowed to begin the class and ended once the students bowed to the teacher at the end of the class. The recordings captured the entire one-hour class period. The audio recording was from the same camera, with no additional microphones.

Instruments. Cheffers’ Adaptation of Flanders’ Interaction Analysis System (CAFIAS) is an interval recording system requiring observation of the instructor and the students (Cheffers et al., 1980). It is an adaptation of the Flanders’ Interaction Analysis System (Flanders, 1970) by the addition of physical behavior categories. Behaviors by the teacher and by the students are coded according to one of 20 possible behaviors. The coding continues to be scored every six seconds or until the behavior changes. The instrument has been validated for associating certain behaviors and patterns of behavior with superior student learning (Silverman & Buschner, 1990).

Academic Learning Time – Physical Education (ALT-PE) is a momentary time sampling recording system requiring observation of up to three students (Rife et al., 1985; Metzler, 1989). Each student is observed for six seconds, then recording is done for six seconds, then the next student is observed in a rotating repeating fashion. At each interval, students are recorded on three levels: the Context Level, the Learner Involvement Level, and the Difficulty Level (Table 2). The Context Level can be
described by one of 10 behaviors, the Learning Involvement Level can be described by one of six behaviors, and the Difficulty Level one of two options (Table 2). Students were selected from the available pool only if they were in the camera field of view for the entire class. From that group, students were randomly selected for observation. The instrument has been validated for associating ALT-PE with superior student learning (Ko, 1986; Munusturlar, Mirzeoglu, & Mirzeoglu, 2014).

Each video was scored at separate times using the CAFIAS and ALT-PE. Each video was reviewed continuously for the entire duration of the class. Class duration was defined as the time between the end of the bow at the start of class and the start of the bow at the end of class. Intra-rater reliability was established by the observer rescoring the first three videos viewed at least three months later. The first three videos represent one instructor each from the Low, Middle, and High groups.

Intra-rater reliability was calculated using Pearson’s correlation. The correlation for the CAFIAS was significant for all three videos (P<0.0001) and the correlation was high ($r^2=0.98, 0.99, \text{ and } 0.99$). The correlation for the ALT-PE was significant for all three videos (P<0.0001) and the correlation was high ($r^2=0.92, 0.96, 0.96$).

**Statistical Analysis**

Normality was determined using the D’Agostino-Pearson method. Relationships between CAFIAS categories and ALT-PE categories were evaluated using linear regression to analyze how the CAFIAS categories and ALT-PE domains relate with each other and to provide further evidence for validity in the form of relations to other variables. Significance was set at $\alpha = 0.01$. CAFIAS categories and ALT-PE categories
were compared among three levels of instructor rank (Low, Middle, and High) by visual examination of the data. CAFIAS categories and ALT-PE categories were compared between those instructors teaching primary partner-based classes and those teaching classes without partner work by visual examination of the data. Statistical comparisons were not made due to the low sample size.
CHAPTER 4

RESULTS

Since rank is correlated with duration of practice as a martial artist, it is often assumed that those of higher rank, who have been learning and teaching martial arts for a longer number of years, are more competent in both the performance and teaching of martial arts than those of lower rank. The purpose of this study was to relate martial arts instructor’s behavior with their rank. This chapter describes the results of data analysis with regards to the CAFIAS, ALT-PE, and their relationships. Data will be presented as comparing CAFIAS and ALT-PE, comparing among instructor rank level (Low, Middle, High), and comparing between those instructors teaching primarily partner-based classes and those teaching classes without partners.

Relationship between CAFIAS and ALT-PE

Statistically significant linear regression relationships are provided in Table 3 and Figure 1. Five CAFIAS categories and three response patterns had significant relationships with ALT-PE categories. This data confirms that there are relations to other variables between the CAFIAS and ALT-PE which are internally consistent. For example, there was a strong relationship between the CAFIAS category of teacher verbal
instruction as well as the pattern of verbal instruction with the ALT-PE domain of cognitive engagement.

**Comparison among instructor rank**

High ranked instructors had nearly twice the amount of nonverbal praise of Low and Mid ranked instructors (Table 4). High ranked instructors provided more instruction and gave less directions than Low and Mid ranked instructors. High ranked instructors had more interactions where students provided higher order verbal and nonverbal responses than Low and Mid ranked instructors. Low ranked instructors had more confusion than Mid and High ranked instructors. High ranked instructors had less silence than Low and Mid ranked instructors.

High ranked instructors had dramatically less wait time than Low and Mid ranked instructors (Table 5). They also had 50% more time dedicated to Cognitive learning. Low ranked instructors had dramatically less Practice-Indirect time than High and Mid ranked instructors. Mid ranked instructors had less ALT-PE than Low and High ranked instructors.

**Comparison between partner and non-partner based classes**

Instructors of non-partner classes gave notably more verbal praise than instructors of partner classes (Table 6). They also had more verbal acceptance, gave more directions, had students who gave predictable verbal and nonverbal responses and analytical
nonverbal responses. Instructors of partner classes gave more verbal and nonverbal instruction.

Instructors of non-partner classes spent more time in transition, management, and rest than instructors of partner classes (Table 7). They also had a higher ALT-PE. Instructors of partner classes had more Cognitive learning time and dramatically more Indirect skill practice time than instructors of non-partner classes.
CHAPTER 5

DISCUSSION

Since rank is correlated with duration of practice as a martial artist, it is often assumed that those of higher rank, who have been learning and teaching martial arts for a longer number of years, are more competent in both the performance and teaching of martial arts than those of lower rank. The purpose of this study was to relate martial arts instructor’s behavior with their rank. This chapter presents a discussion of the results. The discussion will focus on the relationship between CAFIAS and ALT-PE categories, the differences among three levels of instructor rank, the differences between classes with partners and without partners, rationale for using the chosen observation systems, and the limitations of the study.

Relationship between CAFIAS and ALT-PE

Several statistically significant relationships between CAFIAS categories and response patterns were found with ALT-PE domains. The category of teacher verbal behavior and the pattern of teacher verbal (lecture) was positively associated with the cognitive engagement domain. This reflects the instructor lecturing to the students and each system is measuring a similar construct. The relationship is not perfect, possibly because of the time sampling method or because of the slight differences in the construct.
The ALT-PE uses a six-second interval whereas the CAFIAS uses a three-second interval, or when the behavior changes. The CAFIAS teacher verbal category is scored regardless of if an individual student is attentive or not, whereas the ALT-PE cognitive engagement domain is only scored if the student appears to be cognitively engaged. Teacher verbal behavior was also positively associated with the motor indirect domain whereas teacher nonverbal behavior was negatively associated with the motor indirect domain. Those classes which were partner in nature involved more motor indirect activities and were also more lecture-based with less teacher demonstration, which may explain this relationship. A robust qualitative analysis would be needed to establish the nature of this relationship. Teacher verbal and teacher nonverbal was negatively associated with the transition domain. It is possible those classes which had more instruction had fewer transitions as the activities remained more static. To confirm this, the number of different activities conducted during a lesson would be counted, which was beyond the scope of this study.

Student predictable verbal response was negatively associated with motor indirect and cognitive engagement domains. Predictable verbal responses were usually in the response of a call back to a command by the instructor associated with drills. For example, when the instructor calls the name of the form, “Kihon kata shodan”, the students verbally repeat the name to indicate they know the form they are about to do, “Kihon kata shodan.” Those classes which focused on drills did not have partner work and did not involve as much lecture as classes with less drill work. Other studies have found that teachers who reduce partner work and cognitive engagement time increase the amount of time students are engaged in physical activity (Walker, 1990; Randall &
Imwold, 1989). Student predictable nonverbal response as well as the pattern of teacher command and student predictable nonverbal response were negatively associated with motor indirect, supporting the finding that rote drill work was likely to be non-partner-based and did not involve as much teacher lecture.

CAFIAS categories share some characteristics with ALT-PE domains as demonstrated in this study. The CAFIAS measures the interaction between the instructor and the students (Cheffers et al., 1980), which does not provide information about what the students are doing. The ALT-PE measures student activity (Metzler, 1989) but does not provide information about teacher activities or interactions. Using both in this study provides more complete data to understand instructional activities during the classes recorded. No other studies directly comparing the CAFIAS and ALT-PE have been found. However, studies comparing teacher behavior with other systems and ALT-PE have documented that teacher behavior has relationships with ALT-PE domains (Hastie, 1994; LaMaster & Lacy, 1993; Phillips & Carlisle, 1983).

**Comparison among instructor rank**

Although no statistical tests were applied to analyze difference among instructors according to rank, some apparent differences were evident and worthy of discussion. Instructors in the High rank group had appreciably less wait and transition time than instructors in the Low or Mid rank groups. Wait and transition time is presumably an undesirable use of classroom time, and studies have shown than interventions aimed at educating teachers can reduce wait and transition time (Hart, 1983). More effective teachers have been shown to spend less time on organizational tasks, such as waiting and
transition, than less effective teachers (Phillips & Carlisle, 1983). This finding supports the hypothesis that High ranked instructors are more effective managers of the class time than instructors of Low or Mid rank.

Instructors in the High and Mid rank groups had appreciably more time with students cognitively engaged than instructors in the Low rank group. This may be attributed to the type of class run by each instructor. High ranked instructors spent more time lecturing (verbal instruction) than Mid ranked instructors, who spent more time lecturing than Low ranked instructors. High and Mid ranked instructors also spent more time demonstrating, with students observing and being cognitively engaged. One study documented more cognitive engagement by eight elementary physical education teachers (experienced, analogous to the High or Mid rank instructors) than eight elementary teachers in training (inexperienced, analogous to the Low rank instructors) (Griffey, 1991).

Instructors in the High rank group elicited less predictable student verbal and non-verbal responses, and stimulated more student analytical nonverbal response than instructors in the Low or Mid rank groups. This suggests that the classes of High rank instructors had better communication, encouraging students to participate in creative ways, which is similar to expert golf instructors (Schempp et al., 2004). Coaches of more satisfied basketball teams similarly created environments where creative student responses were more likely than with coaches of less satisfied teams (Fisher et al., 1982). Experienced physical education teachers also give more affective praise (Tan, 1996).

Instructors in the High rank group had less silence than instructors in the Low and Mid rank groups. Silence is rare in modern martial arts classes except for an optional
brief period of meditation at the beginning and end of class (Vertonghen, Theebom, & Cloes 2012). Instructors in the Low and Mid rank groups often incurred silence while they were considering the next class activity. In classes where teachers had one hour to plan versus 2 minutes, less silence has been observed (Imwold et al., 1984). It is possible the High rank instructors planned their lesson in more detail than the others, or their greater experience allowed them to adapt quickly to the class with minimal planning (Graham, Hopple, Manross, & Sitzman, 1993; Griffey & Housner, 1991; Kim & Housner, 2010; Tan, 1996). Similarly, instructors in the Low rank group had more confusion than instructors in the Mid and High rank groups. This may reflect a lack of experience in managing the class when unanticipated events occur or not having a ready lesson plan (Graham et al., 1993).

Instructors in the Low rank group had virtually no motor indirect time, indicating they rarely used partner exercises. Martial arts forms are typically conducted as individual student activities (Hopkins, 2005). Creating drills and opportunities for student to student interaction in the context of improving forms may require more experience as an instructor (Graham et al., 1993). Alternatively, the Low rank group may have been more focused on a traditional practice-mastery based class while the Mid and High rank groups may have focused on refining techniques already known through partner work.

Instructors in the Low rank group had more teacher verbal direction than instructors in the Mid and High rank groups. This is consistent with a direct instruction model, where the instructor retains tight control over the class and gives orders expecting
them to be followed precisely (Metzler, 2011). This is also consistent with findings in coaches, where less successful coaches had a more direct coaching style (Rotsko, 1979).

ALT-PE was not different among instructor rank groups. A lack of difference in ALT-PE between specialist teachers and classroom teachers delivering physical education classes has been documented previously (Placek & Randall, 1986). In that study, it was hypothesized that specialist instructors may select more appropriate tasks for the students without necessarily affecting their motor engagement time. Another study which showed no difference in ALT-PE between novice and expert physical education teachers hypothesized that the system may not be sensitive enough to detect differences in pedagogical approach (van der Mars, Vogler, Dart, & Cusimano, 1995). It is possible that the ALT-PE, while well correlated with student psychomotor skill acquisition (Ko, 1986; Silverman & Buschner, 1985; Shaffner, 1986), may not be capturing the full spectrum of knowledge students acquire in a physical skills class (Dodds, 1994). Therefore, the lack of difference between among instructor rank groups in ALT-PE may not indicate that student achievement between them would also be equivalent.

It was hypothesized that Low rank instructors would behave similar to advanced beginning teachers. One theory of teacher development (Berliner, 1988) suggests teachers progress through five stages: novice (zero to one years’ experience), advanced beginner (two to three years), competent (three to four years), proficient (five or more), and expert (only some progress to this level). Note that the number of years is for full-time professional teachers. Most martial artists practice less than five hours a week, so the number of years training and teaching cannot be extrapolated directly. If one were to compare the number of hours per week, martial artists would require approximately eight
years to equal one year of full-time teaching experience. Low rank instructors have typically been training in martial arts for three to five years and teaching for two to three years, which would align them with advanced beginner teachers. In our sample, the average duration of training was 13 years, but the average time teaching was three years. Advanced beginners know and follow rules structures with some ability to break those rules, but do not yet set priorities or determine what is and is not important. This is consistent with the observation in this study that Low rank instructors conduct a class with a high degree of control and predictable student responses.

It was expected that Mid rank instructors would behave similar to competent teachers (Berliner, 1988). Mid rank instructors have typically been training in martial arts for 10-12 years and teaching for three to five years. In our sample, the average duration of training was 13.5 years, and the average time teaching was seven years. Competent teachers are more personally in control of their class and know what to focus on and ignore, but are not yet fluid or flexible. Compared with the Low rank group, Mid rank instructors had more motor indirect time, more cognitive engagement with teacher instruction, and less teacher verbal directions. This reflects a more cognitively engaged teaching style with the use of partners, which is approaching the style of the High rank group. Compared with the High rank group, the Mid rank instructors had more student predictable response, student analytical response nonverbal, silence, wait time, and transition time. This suggests that Mid ranked instructors do not have the classroom management skills of the High ranked instructors. In one study of specialist teachers (analogous to the High rank group), in service teachers (analogous to the Mid rank group), and pre-service teachers (analogous to the Low rank group), differences were
noted among the three levels (Zeng, Leung, & Hipscher, 2010). In contrast with that study, where the in service teachers had more motor engagement and teacher behaviors unrelated to instruction, the Mid rank group in this study had similar motor engagement and engaged with the students as much as the other groups.

It was expected that High rank instructors would behave similar to proficient or expert teachers (Berliner, 1988). High rank instructors have typically been training in martial arts for 15-20 years and teaching for 10-12 years. In our sample, the average duration of training was 22 years, and the average time teaching was 19 years. Proficient teachers have an intuitive sense of a situation and numerous existing cognitive models to deal with a wide variety of situations. Compared with the other groups, High rank instructors in this study had more verbal instruction, cognitive engagement, and motor indirect time and less silence, wait, and transition time. As noted, this is consistent with findings from physical education specialists, who have excellent control of the class and deliver more cognitive material than in service or pre-service teachers (Zeng et al., 2010).

Differences in instructor behaviors were noted among Low, Mid, and High ranked instructors. Low ranked instructors led classes in a direct instruction model without partner work and with many opportunities for practice. Mid ranked instructors led classes with more cognitive engagement than the Low ranked instructors, but lacking the classroom management skills of the High ranked instructors. High ranked instructors led classes with less wait and transition time, less silence, more cognitive engagement time, and more elaborate student engagement. These findings support the hypothesis that High ranked instructors display characteristics consistent with being more skilled teachers than
Mid ranked instructors, and that Mid ranked instructors display characteristics consistent with being more skilled teachers than Low ranked instructors.

Although all of the instructors in this study had engaged in several teaching skills workshops for local martial artists, none were trained in physical education pedagogy in a formal setting, such as a university. It was expected that the majority of their teaching perspective came from the apprenticeship of observation (Schempp, 1989). The apprenticeship of observation is when a teacher's experience with teaching is shaped by their experience as a student. In martial arts, training is usually informal, similar to sports coaching (Mallett, Trudel, Lyle, & Rynne, 2009). In martial arts, acquisition of experience and content knowledge is the only route for improvement of pedagogical skill for the majority of martial artists, as there are few formal teacher training programs.

Several studies have documented that improving content knowledge improves pedagogical practice. In one, physical education teachers given a four hour workshop on badminton showed improved student performance and pedagogical techniques compared with their teaching before the workshop (Ward, Kim, Ko, & Li, 2015). In another study, physical education teachers reported that their pedagogical activities in non-expert sports was less developed than their activities in sports in which they had expertise (Schempp, Manross, Tan, & Fincher, 1998). The findings from our study support those from the literature, where pedagogical technique improved progressively as a function of time in practice and continued acquisition of content knowledge between Low, Mid, and High ranked instructors.
Comparison among partner or non-partner class structure

During data analysis, it became evident that classes taught with regular use of partners produced noted differences from classes taught without partners. Most obvious was the difference in motor indirect—those classes with partners had dramatically higher motor indirect. On the basis of this observation, a comparison of these two class structures was warranted.

Non-partner classes had more teacher praise than partner classes. Behavior-specific praise is considered to be slightly effective for changing student behavior, whereas general praise has no effect (Brophy, 1981). The CAFIAS system does not distinguish between general praise and behavior-specific praise (Floress, Beschta, Meyer, & Reinke, 2017). Students in non-partner classes had more predictable verbal and nonverbal responses, analytical nonverbal responses, and ALT-PE. These students were more physically active, possibly creating more opportunities for the instructor to provide praise as feedback. The students may have also been responding predictably to the regular teacher direction given, which was much higher in non-partner classes than partner classes, and this created a sense of positive affect in the instructor, which prompted them to utter positive statements (Brophy, 1981).

Students in non-partner classes spent more time in transition, management, and rest than students in partner classes. This is consistent with the result that instructors gave more directions in non-partner classes. More rest time may have been necessary due to the higher intensity nature of the non-partner classes; in partner classes, one member of the pair is assisting rather than executing, creating natural rest periods. Transition and management may have been higher in non-partner classes due to a need to
create more types of exercises (Oh, 2014). More instructor directions may have been given since the non-partner forms classes were traditionally conducted with the instructor giving a count for each move, whereas partner forms classes proceed without the instructor giving a count for students to progress to the next step.

Students in partner classes receive far more cognitive engagement, teacher talk, and teacher nonverbal instruction than students in non-partner classes. All of these are consistent with a more lecture-based class, typical of a partner form, possibly due to the complexity of the movements required of forms using a partner (De Cree, 2013). As expected, students in partner classes had dramatically more motor indirect time than students in non-partner classes.

Students in non-partner classes had higher ALT-PE than students in partner classes. Within the two schools involved in this study, the minimum time required to earn a black belt in a striking art (e.g. karate) is 3 years, and the minimum time required to earn a black belt in a throwing art (e.g. aikido) is 5 years. This disparity may be explained by the relative ALT-PE of partner (throwing art) and non-partner (striking art) classes. In partner classes, much of the time is spent in support of the primary learner, so the assisting partner is not actively engaged in learning. It is possible that the longer time to earn the same rank is due to this lower ALT-PE in partner classes. Involvement of a partner is required, as without a partner learning throwing techniques is not as effective (Gomes, Meira, Franchini, & Tani, 2002). In one study of physical education teachers, an increase in ALT-PE was achieved partly by reducing partner work (Walker, 1990).
Rationale for using the chosen observation systems

The CAFIAS was designed in the early 1970s and used throughout that decade and into the early 1980s. The ALT-PE was pioneered in the late 1970s and used into the 1980s. Recent literature using either system is sparse, with the most recent use of CAFIAS in the literature reviewed for this study being 2010 (Yu & Kim) and the most recent use of ALT-PE being 2014 (Munusturlar), both of which were studies conducted outside the United States. While a review of the change in educational research over the prior 40 years is beyond the scope of this discussion, several possibilities explain the reduced use of the CAFIAS and ALT-PE.

Regarding ALT-PE, it is likely that the system does not capture sufficient information to explain differences among teachers. Studies using ALT-PE have repeatedly found no difference between experienced and inexperienced teachers with regards to ALT-PE time, while acknowledging that the teaching behaviors of experienced and inexperienced teachers are obviously different (Dodds, 1994; Placek & Randall, 1986; van der Mars, Vogler, Dart, & Cusimano, 1995). The CAFIAS suffers a similar flaw in that it describes interactions, which does not capture all of the teaching behaviors which may influence learning (Griffey, 1991). In Schempp et al. (2004), which used the CAFIAS, the authors were suggested to include qualitative data to increase the completeness of the observations (B. McCullick, personal communication, September 14, 2016). An expanded understanding and use of qualitative methods to fill the gaps in the CAFIAS and ALT-PE may have supplanted older systematic observation systems.

No interaction system has been applied to collecting systematic observational data about a martial arts class. The CAFIAS was chosen as the most relevant system for
evaluating teacher-student interactions in a psychomotor skills acquisition setting. Systematic observation of a martial arts class has been conducted with a classroom observation record (Weise, 1995) as well as the ALT-PE (Ko, 1986). In the study by Weise (1995), the purpose was to validate the instrument and in the study by Ko (1986), the purpose was to determine if ALT-PE correlated with martial arts skill acquisition. No study comparing the teaching behaviors based on the experience level of the martial artist, as defined by their rank level, has been conducted. The ALT-PE was selected because it has a rich history of research use and validation and has been used in other studies comparing teachers of varying levels. This would allow for comparisons between the findings of this study and previous studies. No study could be found which used both the CAFIAS and ALT-PE, and the opportunity to compare results from two systems with a rich history of use in research was novel.

**Limitations**

Participants for this study were selected on the basis of convenience and knowledge of the two schools involved in the study. There were more than eight martial arts schools in the Athens, GA area at the time of this study. The schools chosen had a relationship with the author and could be relied upon to participate. Furthermore, the author knew the capabilities of the participants, types of classes, and physical layout of the schools which participated. A larger sample of schools and participants may have yielded different, more generalizable results. A larger sample size would have also
allowed for statistical analysis. The low sample size prevented statistical comparisons among the rank levels, which limits generalizability of the findings.

Participants were given little direction with regards to the class to be taught. There was variability in warm up time and type of class taught, and this variability was inconsistent across rank levels. It is possible this additional variability introduced bias into the results. Selecting instructors who taught the same type of class (e.g. all non-partner) and providing more specific direction about warm-up time may have minimized this variability. Participants volunteered to participate, and this may have created a selection bias towards instructors who were more comfortable being recorded. It is possible lower-performing instructors did not volunteer and the data may not reflect all instructors at the selected schools.

This study involved the use of quantitative observation methods in the form of the CAFIAS and ALT-PE. Observations which may have been of a qualitative nature may have helped inform interpretation of the quantitative results.

A single observer performed coding of the videos for CAFIAS and ALT-PE. It is possible personal bias may have been reduced by using more than one observer. However, including more than one observer would have introduced inter-observer variability and may have resulted in lower intra-observer reliability. The extremely high intra-observer correlation in this study suggests that, if personal bias was present, it was consistently applied.
Since rank is correlated with duration of practice as a martial artist, it is often assumed that those of higher rank, who have been learning and teaching martial arts for a longer number of years, are more competent in both the performance and teaching of martial arts than those of lower rank. The purpose of this study was to relate martial arts instructor’s behavior with their rank. The purpose of this chapter is to present a review of the study, a conclusion, recommendations for martial arts instructors, and recommendations for future research.

**Review of the Study**

The purpose of this study was to relate martial arts instructor’s behavior with their rank. Specifically, this study addressed the following research questions:

1. What are the relationships between CAFIAS and ALT-PE?
2. What differences exist among instructors of low, middle, and high rank?
3. What differences exist between classes taught primary with partners versus those taught without partners?
Because of the lack of a centralized organization to teach and certify teachers, most martial arts instructors learned to teach through the apprenticeship of observation. As students progress in rank, they gain greater responsibility and authority, eventually being able to run an entire class for the duration of a teaching period, usually 1-2 hours. Most martial arts instructors have no formal understanding of pedagogy and often have pedagogical techniques which are limited in scope and effectiveness. Learning through the apprenticeship of observation may lead to poor pedagogical techniques by the instructor, and propagation of bad pedagogical techniques through ‘generations’ of instructor-to-student transmission (Czarnecka, 2001).

Behavioral observation systems attempt to quantify student behavior, teacher behavior, and student-teacher interactions. These data are helpful for determining what, exactly, is occurring in the practice space and how that may affect student learning. Systematic observation methods attempt to minimize bias in behavioral observation. This study used Cheffers’ Adaptation of Flanders’ Interaction Analysis System (CAFIAS) to describe interaction patterns between the teacher and students and the Academic Learning Time- Physical Education (ALT-PE) to quantify the amount of time students spend engaged in various activities during a class. Criterion and construct validity have been established for the CAFIAS and the ALT-PE, and both have been used to document differences among instructors.

This study involved collection of data from instructors of three levels of rank: “Low”, “Middle”, and “High”. Participants were considered “Low” rank if they were ranked as a first-degree black belt, as “Middle” rank if they were ranked as a second degree black belt or a third degree black belt with less than 12 years of teaching martial
arts, and as “High” rank if they were ranked as a third degree black belt with 12 or more years of teaching martial arts or a fourth-degree black belt or higher. Participants were recorded teaching a typical martial arts forms (“kata”) class.

Conclusions

The conclusions for this study are divided into three categories: relationships between CAFIAS and ALT-PE, comparison among ranks of instructors, and comparison between partner and non-partner classes.

Numerous relationships were identified between CAFIAS categories and ALT-PE domains. This data provides further evidence for the validity of each system, as relations to other variables is one criteria by which validity can be evaluated.

Differences existed among the three ranks of instructors for numerous CAFIAS categories and ALT-PE domains. Instructors in the High group displayed behaviors consistent with more experienced teachers, whereas those in the Low group displayed behaviors consistent with less experienced teachers. Those in the Mid group had behaviors consistent of teachers at a competent level of development, between Low and High ranked instructors. This confirms the hypothesis that there is a positive relationship between rank and instructor behaviors expected to result in better student performance.

Differences existed between partner and non-partner classes for numerous CAFIAS categories and ALT-PE domains. Notably, partner classes had more cognitive engagement and lecturing and less ALT-PE than non-partner classes. This difference in amount of time dedicated to motor activities may explain the difference in time required to advance in martial arts styles.
Recommendations for Martial Arts Instructors

Instructors of Mid rank should practice transitioning their instructional strategy from a direct instruction method to a more dynamic, communicative structure. Instructors of Mid rank should consider engaging in more planning activities in order to minimize the amount of classroom time spent in silence, waiting, or in transition. Instructors of High rank display characteristics consistent with proficient and expert teachers, and should continue to teach classes as they have been. All instructors should minimize partner practice time in order to increase ALT-PE.

Recommendations for Future Research

Using a larger sample from a varied number of martial arts schools would allow for statistical comparisons to be made and results to be extrapolated to the general population. Adding a qualitative systematic observation would provide more data to put the results in context. Comparing student skill acquisition in partner and non-partner classes may improve understanding in the difference in skill and rank advancement between partner martial arts (e.g., judo, aikido) and non-partner martial arts (e.g., karate, Kyuki-Do). Comparing martial arts teachers who have and have not had any formal teacher training would help determine the usefulness of such training.
REFERENCES


Hart, C.L. (1983) The effects of modification of teacher behavior on the academic learning time of selected students in physical education (Unpublished doctoral dissertation). The Ohio State University, Columbus, OH.


Ko, B. (1986) The relationships among student achievement, academic learning time in physical education (ALT-PE), and selected student characteristics in two university Tae Kwon Do classes (Unpublished doctoral dissertation). Syracuse University, Syracuse NY.


TABLES

Table 1

Characteristics of participants.

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>School</th>
<th>Rank Level</th>
<th>Gender</th>
<th>Age</th>
<th>Number of Years Martial Arts Experience</th>
<th>Number of Years Teaching Martial Arts</th>
<th>Highest Black belt Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>AMA</td>
<td>Low</td>
<td>Male</td>
<td>55</td>
<td>22</td>
<td>4</td>
<td>First</td>
</tr>
<tr>
<td>B</td>
<td>AYK</td>
<td>Low</td>
<td>Male</td>
<td>31</td>
<td>25</td>
<td>3</td>
<td>First</td>
</tr>
<tr>
<td>C</td>
<td>AYK</td>
<td>Low</td>
<td>Female</td>
<td>34</td>
<td>4.5</td>
<td>3</td>
<td>First</td>
</tr>
<tr>
<td>D</td>
<td>AYK</td>
<td>Low</td>
<td>Female</td>
<td>24</td>
<td>3</td>
<td>2</td>
<td>First</td>
</tr>
<tr>
<td>E</td>
<td>AMA</td>
<td>Middle</td>
<td>Male</td>
<td>38</td>
<td>20</td>
<td>10</td>
<td>Second</td>
</tr>
<tr>
<td>F</td>
<td>AMA</td>
<td>Middle</td>
<td>Male</td>
<td>32</td>
<td>10.5</td>
<td>5</td>
<td>Third</td>
</tr>
<tr>
<td>G</td>
<td>AMA</td>
<td>Middle</td>
<td>Male</td>
<td>37</td>
<td>10</td>
<td>5</td>
<td>Third</td>
</tr>
<tr>
<td>H</td>
<td>AMA</td>
<td>High</td>
<td>Male</td>
<td>40</td>
<td>16</td>
<td>12</td>
<td>Third</td>
</tr>
<tr>
<td>I</td>
<td>AMA</td>
<td>High</td>
<td>Male</td>
<td>42</td>
<td>26</td>
<td>23</td>
<td>Fifth</td>
</tr>
<tr>
<td>J</td>
<td>AYK</td>
<td>High</td>
<td>Male</td>
<td>39</td>
<td>24</td>
<td>22</td>
<td>Fourth</td>
</tr>
</tbody>
</table>
Table 2

Academic Learning Time – Physical Education (ALT-PE) levels on which the observed student is scored at each time interval.

<table>
<thead>
<tr>
<th>Context Level</th>
<th>Learner Involvement Level</th>
<th>Difficulty Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait</td>
<td>Pause</td>
<td>Appropriate</td>
</tr>
<tr>
<td>Transition</td>
<td>Waiting</td>
<td>Inappropriate</td>
</tr>
<tr>
<td>Management</td>
<td>Off-Task</td>
<td></td>
</tr>
<tr>
<td>Rest</td>
<td>Cognitive</td>
<td></td>
</tr>
<tr>
<td>Practice Unspecified</td>
<td>Indirect</td>
<td></td>
</tr>
<tr>
<td>Scrimmage</td>
<td>Motor</td>
<td></td>
</tr>
<tr>
<td>Game</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonfocused</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Warmup</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3

Relationship between CAFIAS categories and patterns and ALT-PE domains. Direction of relationship designated to be positive (+) or negative (-) for each ALT-PE domain.

<table>
<thead>
<tr>
<th>CAFIAS Category</th>
<th>ALT-PE Domain</th>
<th>r</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Verbal (5)</td>
<td>Transition (-)</td>
<td>0.81</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Motor Indirect (+)</td>
<td>0.79</td>
<td>0.007</td>
</tr>
<tr>
<td></td>
<td>Engaged Cognitive (+)</td>
<td>0.79</td>
<td>0.006</td>
</tr>
<tr>
<td>Teacher Verbal Direction (6)</td>
<td>Motor Indirect (-)</td>
<td>0.77</td>
<td>0.009</td>
</tr>
<tr>
<td></td>
<td>Engaged Cognitive (-)</td>
<td>0.87</td>
<td>0.001</td>
</tr>
<tr>
<td>Teacher Nonverbal Instruction (15)</td>
<td>Transition (-)</td>
<td>0.85</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Motor Indirect (-)</td>
<td>0.88</td>
<td>0.001</td>
</tr>
<tr>
<td>Predictable Student Nonverbal Response (18)</td>
<td>Motor Indirect (-)</td>
<td>0.82</td>
<td>0.004</td>
</tr>
<tr>
<td>Teacher Verbal Pattern (5-5)</td>
<td>Engaged Cognitive (+)</td>
<td>0.81</td>
<td>0.005</td>
</tr>
<tr>
<td>Teacher Direct Command Student Predictable Nonverbal Response Pattern (6-18)</td>
<td>Motor Indirect (-)</td>
<td>0.82</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Engaged Cognitive (-)</td>
<td>0.86</td>
<td>0.001</td>
</tr>
<tr>
<td>Student Predictable Nonverbal Response Pattern (18-18)</td>
<td>Rest (+)</td>
<td>0.79</td>
<td>0.007</td>
</tr>
</tbody>
</table>
Table 4
Mean ± standard deviation and percent values for CAFIAS categories according to rank of the instructor: Low (first degree black belt), Mid (second or third degree black belt), and High (fourth degree and above black belt). Values in bold are notably different among rank level.

<table>
<thead>
<tr>
<th>CAFIAS Category</th>
<th>Low #</th>
<th>Mid #</th>
<th>High #</th>
<th>Low %</th>
<th>Mid %</th>
<th>High %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Praise Verbal (2)</td>
<td>129 ± 56</td>
<td>108 ± 61</td>
<td>147 ± 101</td>
<td>5.1%</td>
<td>4.6%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Teacher Praise Nonverbal (12)</td>
<td>14 ± 11</td>
<td>12.33 ± 5</td>
<td>26 ± 10</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Teacher Acceptance Verbal (3)</td>
<td>35 ± 17</td>
<td>27 ± 13</td>
<td>44 ± 30</td>
<td>1.4%</td>
<td>1.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Teacher Acceptance Nonverbal (13)</td>
<td>2 ± 2</td>
<td>3 ± 3</td>
<td>1 ± 1</td>
<td>0.1%</td>
<td>0.2%</td>
<td>0%</td>
</tr>
<tr>
<td>Teacher Question Verbal (4)</td>
<td>48 ± 18</td>
<td>56 ± 18</td>
<td>50 ± 28</td>
<td>1.9%</td>
<td>2.5%</td>
<td>1.8%</td>
</tr>
<tr>
<td>Teacher Question Nonverbal (14)</td>
<td>2 ± 3</td>
<td>6 ± 4</td>
<td>2 ± 1</td>
<td>0.1%</td>
<td>0.3%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Teacher Instruction Verbal (5)</td>
<td>596 ± 156</td>
<td>621 ± 204</td>
<td>853 ± 232</td>
<td>24%</td>
<td>28%</td>
<td>32%</td>
</tr>
<tr>
<td>Category</td>
<td>Frequency</td>
<td>Mean ± SD</td>
<td>25%</td>
<td>50%</td>
<td>75%</td>
<td>90%</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------</td>
<td>-----------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td><strong>Teacher Instruction Nonverbal</strong></td>
<td>15</td>
<td>229 ± 89</td>
<td>196</td>
<td>304</td>
<td>196</td>
<td>443</td>
</tr>
<tr>
<td><strong>Teacher Direction Verbal</strong></td>
<td>6</td>
<td>380 ± 123</td>
<td>229</td>
<td>292</td>
<td>229</td>
<td>293</td>
</tr>
<tr>
<td><strong>Teacher Direction Nonverbal</strong></td>
<td>16</td>
<td>18 ± 11</td>
<td>13</td>
<td>17</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td><strong>Teacher Criticism Verbal</strong></td>
<td>7</td>
<td>43 ± 16</td>
<td>13</td>
<td>44</td>
<td>13</td>
<td>55</td>
</tr>
<tr>
<td><strong>Teacher Criticism Nonverbal</strong></td>
<td>17</td>
<td>2 ± 3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Student Predictable Response Verbal</strong></td>
<td>8</td>
<td>78 ± 58</td>
<td>95</td>
<td>95</td>
<td>78</td>
<td>95</td>
</tr>
<tr>
<td><strong>Student Predictable Response Nonverbal</strong></td>
<td>18</td>
<td>643 ± 94</td>
<td>501</td>
<td>258</td>
<td>514</td>
<td>159</td>
</tr>
<tr>
<td><strong>Student Analytical Response Verbal</strong></td>
<td>8</td>
<td>55 ± 41</td>
<td>33</td>
<td>33</td>
<td>56</td>
<td>71</td>
</tr>
<tr>
<td><strong>Student Analytical Response Nonverbal</strong></td>
<td>18</td>
<td>41 ± 32</td>
<td>45</td>
<td>45</td>
<td>56</td>
<td>81</td>
</tr>
<tr>
<td><strong>Student Initiated Question Verbal</strong></td>
<td>9</td>
<td>44 ± 23</td>
<td>57</td>
<td>57</td>
<td>30</td>
<td>57</td>
</tr>
<tr>
<td><strong>Student Initiated Question Nonverbal</strong></td>
<td>19</td>
<td>6 ± 2</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td><strong>Confusion</strong></td>
<td>10</td>
<td>32 ± 18</td>
<td>20</td>
<td>20</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>Silence (20)</td>
<td>53 ± 35</td>
<td>51 ± 11</td>
<td>31 ± 7</td>
<td>2.4%</td>
<td>2.3%</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
Table 5
Mean ± standard deviation and percentage of total values for ALT-PE categories according to rank of the instructor: Low (first degree black belt), Mid (second or third degree black belt), and High (fourth degree and above black belt). Values in bold are notably different among rank level.

<table>
<thead>
<tr>
<th>ALT-PE Category</th>
<th>Low #</th>
<th>Mid #</th>
<th>High #</th>
<th>Low %</th>
<th>Mid %</th>
<th>High %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait</td>
<td>5 ± 5</td>
<td>8 ± 4</td>
<td>1 ± 1</td>
<td>1.5%</td>
<td>3.1%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Transition</td>
<td>28 ± 13</td>
<td>25 ± 9</td>
<td>19 ± 9</td>
<td>9.1%</td>
<td>9.3%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Management</td>
<td>30 ± 5</td>
<td>28 ± 20</td>
<td>21 ± 16</td>
<td>9.3%</td>
<td>10%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Rest</td>
<td>13 ± 9</td>
<td>6 ± 5</td>
<td>10 ± 9</td>
<td>4.5%</td>
<td>2.3%</td>
<td>2.8%</td>
</tr>
<tr>
<td>Knowledge – Pause</td>
<td>0 ± 0</td>
<td>1 ± 2</td>
<td>1 ± 1</td>
<td>0%</td>
<td>0.5%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Knowledge – Waiting</td>
<td>21 ± 16</td>
<td>11 ± 6</td>
<td>17 ± 5</td>
<td>6.3%</td>
<td>4.4%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Knowledge – Off Task</td>
<td>3 ± 4</td>
<td>0 ± 0</td>
<td>0 ± 0</td>
<td>1.0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Knowledge – Cognitive</td>
<td>45 ± 19</td>
<td>49 ± 35</td>
<td>68 ± 26</td>
<td>15%</td>
<td>20%</td>
<td>22%</td>
</tr>
<tr>
<td>Practice – Pause</td>
<td>2 ± 2</td>
<td>4 ± 4</td>
<td>3 ± 1</td>
<td>0.4%</td>
<td>1.5%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Practice – Waiting</td>
<td>14 ± 10</td>
<td>19 ± 16</td>
<td>16 ± 8</td>
<td>4.2%</td>
<td>6.8%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Practice – Off Task</td>
<td>0 ± 0</td>
<td>1 ± 1</td>
<td>4 ± 3</td>
<td>0%</td>
<td>0.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Practice – Indirect</td>
<td>1 ± 1</td>
<td>19 ± 27</td>
<td>28 ± 12</td>
<td>0.1%</td>
<td>8.1%</td>
<td>8.9%</td>
</tr>
<tr>
<td>Practice – Motor Inappropriate</td>
<td>3 ± 3</td>
<td>2 ± 1</td>
<td>6 ± 7</td>
<td>0.9%</td>
<td>0.6%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Practice – Motor Appropriate (ALT-PE)</td>
<td>88 ± 25</td>
<td>64 ± 23</td>
<td>82 ± 37</td>
<td>28%</td>
<td>24%</td>
<td>25%</td>
</tr>
</tbody>
</table>
Table 6
Mean ± standard deviation and percent values for CAFIAS categories according to type of class: partner or non partner. Values in bold are notably different between types of class.

<table>
<thead>
<tr>
<th>CAFIAS Category</th>
<th>Partner #</th>
<th>Non-Partner #</th>
<th>Partner %</th>
<th>Non-Partner %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Praise Verbal (2)</td>
<td>81 ± 46</td>
<td>148 ± 65</td>
<td>3.3%</td>
<td>5.7%</td>
</tr>
<tr>
<td>Teacher Praise Nonverbal (12)</td>
<td>18 ± 12</td>
<td>17 ± 11</td>
<td>0.7%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Teacher Acceptance Verbal (3)</td>
<td>23 ± 7</td>
<td>40 ± 21</td>
<td>0.9%</td>
<td>1.6%</td>
</tr>
<tr>
<td>Teacher Acceptance Nonverbal (13)</td>
<td>2 ± 4</td>
<td>2 ± 1</td>
<td>0.1%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Teacher Question Verbal (4)</td>
<td>42 ± 25</td>
<td>54 ± 17</td>
<td>1.8%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Teacher Question Nonverbal (14)</td>
<td>4 ± 5</td>
<td>3 ± 2</td>
<td>0.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Teacher Instruction Verbal (5)</td>
<td>941 ± 82</td>
<td>569 ± 122</td>
<td>39%</td>
<td>23%</td>
</tr>
<tr>
<td>Teacher Instruction Nonverbal (15)</td>
<td>500 ± 53</td>
<td>237 ± 86</td>
<td>21%</td>
<td>9.2%</td>
</tr>
<tr>
<td>Teacher Direction Verbal (6)</td>
<td>145 ± 106</td>
<td>406 ± 95</td>
<td>5.6%</td>
<td>16%</td>
</tr>
<tr>
<td>Teacher Direction Nonverbal (16)</td>
<td>21 ± 13</td>
<td>14 ± 9</td>
<td>0.9%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Teacher Criticism Verbal (7)</td>
<td>39 ± 2</td>
<td>50 ± 19</td>
<td>1.6%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Teacher Criticism Nonverbal (17)</td>
<td>3 ± 3</td>
<td>2 ± 2</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Student Predictable Response Verbal (8)</td>
<td>24 ± 24</td>
<td>93 ± 51</td>
<td>0.9%</td>
<td>3.7%</td>
</tr>
<tr>
<td>Student Predictable Response Nonverbal (18)</td>
<td>394 ± 223</td>
<td>634 ± 75</td>
<td>16%</td>
<td>26%</td>
</tr>
<tr>
<td>Student Analytical Response Verbal (8)</td>
<td>49 ± 35</td>
<td>55 ± 45</td>
<td>2.1%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Category</td>
<td>Count</td>
<td>Mean ± SD</td>
<td>Verbal (%)</td>
<td>Nonverbal (%)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>-----------</td>
<td>------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Student Analytical Response Nonverbal (18)</td>
<td></td>
<td>31 ± 19</td>
<td>64 ± 57</td>
<td>1.2%</td>
</tr>
<tr>
<td>Student Initiated Question Verbal (9)</td>
<td></td>
<td>55 ± 29</td>
<td>44 ± 26</td>
<td>2.4%</td>
</tr>
<tr>
<td>Student Initiated Question Nonverbal (19)</td>
<td></td>
<td>4 ± 5</td>
<td>5 ± 3</td>
<td>0.2%</td>
</tr>
<tr>
<td>Confusion (10)</td>
<td></td>
<td>17 ± 7</td>
<td>29 ± 15</td>
<td>0.7%</td>
</tr>
<tr>
<td>Silence (20)</td>
<td></td>
<td>41 ± 17</td>
<td>48 ± 27</td>
<td>1.8%</td>
</tr>
</tbody>
</table>
Table 7
Mean ± standard deviation and percent values for ALT-PE categories according to type of class: partner or non partner. Values in bold are notably different between types of class.

<table>
<thead>
<tr>
<th>ALT-PE Category</th>
<th>Partner #</th>
<th>Non-Partner #</th>
<th>Partner %</th>
<th>Non-Partner %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait</td>
<td>1 +/- 2</td>
<td>6 +/- 5</td>
<td>0.6%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Transition</td>
<td>14 +/- 3</td>
<td>29 +/- 9</td>
<td>5.0%</td>
<td>9.6%</td>
</tr>
<tr>
<td>Management</td>
<td>16 +/- 19</td>
<td>31 +/- 8</td>
<td>6.0%</td>
<td>10.2%</td>
</tr>
<tr>
<td>Rest</td>
<td>7 +/- 11</td>
<td>12 +/- 7</td>
<td>1.9%</td>
<td>3.9%</td>
</tr>
<tr>
<td>Knowledge – Pause</td>
<td>1 +/- 1</td>
<td>1 +/- 2</td>
<td>0.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Knowledge – Waiting</td>
<td>17 +/- 5</td>
<td>17 +/- 13</td>
<td>5.9%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Knowledge – Off Task</td>
<td>0 +/- 0</td>
<td>2 +/- 3</td>
<td>0%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Knowledge – Cognitive</td>
<td>85 +/- 5</td>
<td>40 +/- 16</td>
<td>31%</td>
<td>13%</td>
</tr>
<tr>
<td>Practice – Pause</td>
<td>3 +/-</td>
<td>2 +/- 3</td>
<td>1.0%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Practice – Waiting</td>
<td>14 +/- 8</td>
<td>17 +/- 12</td>
<td>4.6%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Practice – Off Task</td>
<td>2 +/- 3</td>
<td>1 +/- 2</td>
<td>0.7%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Practice – Indirect</td>
<td>40 +/- 9</td>
<td>3 +/- 6</td>
<td>15%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Practice – Motor Inappropriate</td>
<td>5 +/- 7</td>
<td>3 +/- 2</td>
<td>1.8%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Practice – Motor Appropriate (ALT-PE)</td>
<td>53 +/- 15</td>
<td>90 +/- 24</td>
<td>18%</td>
<td>30%</td>
</tr>
</tbody>
</table>
Student Predictable Motor Response

ALT-PE Domain

Motor Indirect
Cognitive

Teacher Talk Pattern

Cognitive Engagement

Teacher Talk Pattern
Figure 1. Relationship between CAFIAS categories (x axis) and ALT-PE domains (y axis). Values for CAFIAS are number of counts of that behavior. Values for ALT-PE are number of 6 second segments with that activity. All relationships are significant (p<0.01).
APPENDIX A

Recruitment Letter

Lead Instructor:

Dear Ken, as discussed, I would like to start the forms workouts and video research recordings of instructors at AKF Athens. Can we come up with a schedule for the classes and have instructors who choose to participate sign up for a teaching period? Thanks!

Instructors:

Dear <instructor>, I am working on my Masters degree in Sport Pedagogy. For my thesis research, I am video recording martial arts instructors of varying ranks teaching a typical forms class. These classes will take place at a special time for AKF Athens or during a regular class period for Athens Yoshukai. The recording and research will last for a typical 1-hour class period. As an adult instructor at AKF Athens/Athens Yoshuakai, you are eligible for participation. You will be given a consent form to fill out prior to the class period. There are enough instructors that, if you choose not to participate, the study will still be viable. If you are interested in helping, please email me and we will schedule you for a class time. Thank you so much!
APPENDIX B
Informed Consent

UNIVERSITY OF GEORGIA
CONSENT FORM
Observation of Martial Arts Instructors

Researcher’s Statement
We are asking you to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. This form is designed to give you the information about the study so you can decide whether to be in the study or not. Please take the time to read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information. When all your questions have been answered, you can decide if you want to be in the study or not. This process is called “informed consent.” A copy of this form will be given to you.

Principal Investigator: Dr. Bryan McCullick
Kinesiology
706-542-4378
Purpose of the Study

The purpose of this study is to record martial arts instructors teaching a forms class for the purposes of documenting the teacher-student interactions and quantify the amount of time students spent in appropriate activity.

Study Procedures

If you agree to participate, you will be asked to …

☐ Conduct a 1-hour lesson in forms, which will be video and audio recorded.

Risks and discomforts

☐ We do not anticipate any risks from participating in this research.

Benefits

☐ You will be provided with the results of the analysis of your teaching session so you may adjust your future instructional approaches.

☐ Learning this information will help inform how to educate future martial arts instructors.

Incentives for participation

None.

Audio/Video Recording
Audio and video recordings are necessary in order to do multiple scoring systems, and to ensure fidelity of the scoring systems (e.g. a video can be rewound and watched again, if necessary). Records will be kept indefinitely.

**Privacy/Confidentiality**

You will be identified only by descriptors (e.g. 22-year-old female 1st degree black belt) and your name will not be associated with the data. Researchers will not release identifiable results of the study to anyone other than individuals working on the project without your written consent unless required by law.

**Taking part is voluntary**

Your involvement in the study is voluntary, and you may choose not to participate or to stop at any time without penalty or loss of benefits to which you are otherwise entitled. If you decide to stop or withdraw from the study, the information/data collected from or about you up to the point of your withdrawal will be kept as part of the study and may continue to be analyzed.

**If you have questions**

The main researcher conducting this study is Dr. Bryan McCullick, a professor, and Dr. Erik Hofmeister, a graduate student at the University of Georgia. Please ask any questions you have now. If you have questions later, you may contact Dr. Bryan McCullick at 706-542-4378. If you have any questions or concerns regarding your rights
as a research participant in this study, you may contact the Institutional Review Board (IRB) Chairperson at 706.542.3199 or irb@uga.edu.

**Research Subject’s Consent to Participate in Research:**

To voluntarily agree to take part in this study, you must sign on the line below. Your signature below indicates that you have read or had read to you this entire consent form, and have had all of your questions answered.

_________________________  _________________________  ______
Name of Researcher        Signature                    Date

_________________________  _________________________  ______
Name of Participant        Signature                    Date

Please sign both copies, keep one and return one to the researcher.