

Non-Linear Pedagogy in Soccer: A Constraints-Led Approach

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Abstract

The aim of this study was to examine the relationship between the *constraints-led approach* and tactical-technical development in youth soccer players, in comparison to the reproductive coaching style. We first focus on the theories of ecological psychology and non-linear pedagogy, as those two theories provide the framework for the *constraints-led approach*. To study this relationship, we specifically focused on task constraints and devised a series of training sessions with pre and post 'tests's. The players in the *constraints-led approach* group exhibited better control (17%), decision-making (25%), and execution (10%) in comparison to the reproductive group.

Table of Contents

	Page
Abstract.....	2
Chapter 1: Introduction.....	4
Purpose of the Study	8
Theoretical Perspective	10
Research Question.....	11
Delimitations and Limitations.....	11
Definitions of Terms	12
Chapter 2: Literature Review	15
Ecological Psychology	16
Non-Linear Pedagogy and Representative Task Design	18
Constraints-Led Approach	19
Reproductive Style	21
Summary	22
Chapter 3: Research Methods	24
Population	24
Data Collection	24
Data Analysis	25
Ethical Considerations	26
References.....	27

Introduction

Soccer is viewed from the perspective that each match consists of two systems (teams) in one environment (stadium), and each team is comprised of individual elements (players) that interact with one another for a common goal (defeat the opponent). Tamarit (2014) supported this claim by stating, "Thus, a football team is a system where a group of players interact with one another to achieve a common goal (a certain way of playing, with the aim of achieving victory – that is the objective of any sport)." The idea is that within the flow of a soccer match, each team, which represents as a complex system, is permanently in a dynamic state that oscillates between order and disorder in non-linear patterns (Mallo, 2015).

To fully understand a soccer team as a complex system, one must grasp the concept of self-organization. In general, the "capacity for self-organization is a property of complex systems which enables them to develop or change internal structure spontaneously and adaptively in order to cope with, or manipulate, their environment" (Cilliers and Spurrett, 1999). With regards to soccer, throughout the course of a match, the team 'spontaneously' changes their structure in order to either take advantage or contain the opposition (environment).

A key characteristic of self-organization revolves around the notion that complex systems 'learn'. Interestingly, Cilliers and Spurrett (1999) said,

"Self-organizing systems increase in complexity. Since they have to 'learn' from experience, they have to 'remember previously encountered situations and compare them with new ones. If more 'previous' information can be stored, the system will be able to make better comparisons. This increase in complexity

implies a local reversal of entropy, which necessitates a flow of energy or information through the systems.”

The idea is that a team (system) can remember and subsequently learn from their previous games against the opposition. For instance, if Team A surprised Team B by playing man-to-man defense all over the field during their first encounter of the season, then the next time the two teams compete against each other, Team B will ‘remember’ the tactic and subsequently be prepared to execute a strong counter-action.

More importantly, the above quote by Cilliers and Spurrett (1999) defends the notion that the coach directly influences the self-organization process of team. The idea is that the more game situations that are explained and taught during training, the more likelihood that the team will be able to ‘remember’ the optimal actions when those situations arise during competition.

Grehaigne and Godbout (1995) defended the notion that a soccer team is a complex system when they said,

“A complex system is made of several simpler elements interacting in a definite manner. Mistakes indicate failures in the interrelationships of various parts of the proposed system. Adaptive action will depend not on the sheer strength of the contenders, but on the continued variation and adaption of the players in the face of the opponents and under the pressure of time. The actions of a given player thus become contingent upon those of others.”

The idea is that the execution of a successful action is widely dependent upon on the positioning or movements of the players without the ball. Surely the possessor must make the decision to dribble, pass, or shoot; however, it is the interactions between

elements (teammates) that facilitates time and space to perform individual or collective actions.

Due to the constant interactions between players, opponents, and the environment during match play, it appears that each training session should resemble the performance setting. Although that notion seems logical, it was not too long ago when the preferred coaching methodology was coach-centered, and the four moments of the game (technical, tactical, physical, and psychological) were trained in isolation. Under this paradigm, the players were not encouraged to think on their own, and instead, they simply followed the coach's commands. More so, under this analytical coaching approach, it was thought that technical proficiency must exist before introducing tactical ideas.

As coaching methodologies and pedagogical approaches expanded, an understanding that teaching players through a tactical centered approach (player-centered) could work. In 1982, an ecological teaching model named Teaching Games for Understanding (TGfU) was born (Clemente, Rocha, Korgaokar, 2012). Under this pedagogical approach, it is thought that "any student can participate in the game with technical limitations and even with these limitations; it can be very competitive (Thorpe, 1990 in Clemente et al., 2012). The idea is that coaches "should apply a different style of teaching that is not based on mere instruction. Instead of acting as instructors or trainers, coaches should become consultants, observers, planners, and organizers of information and skills, trying to stimulate their pupils to advance and to excel until they are able to even surpass the coach's own limitations" (Wein, 2004).

In addition to TGfU, another ecological teaching approach is referred to as the Constraints-Led Approach (CLA), which is a theoretical perspective that aims to

understand the acquisition of coordination patterns in sport (Clemente et al., 2012). A CLA describes how acquisition of movement and decision-making skill is predicated on the interaction between performer, environmental, and task constraints in sport (Chow, Davids, Button, and Renshaw, 2016). In essence, by utilizing a CLA, the coach can use his or her knowledge to manipulate constraints within each training exercise to direct the players' perception to the information considered to be relevant (Clemente, Couceiro, Martins, & Mendes, 2012 in Clemente et al., 2012).

As the sport of soccer continues to grow, it is important to understand pedagogical approaches and their influence on player development. From the perspective that a soccer team is a complex system, it appears that a deeper analysis of the impact of fostering a training environment that includes the elements of a performance environment is needed. Additionally, material published by soccer federations from around the world has supported the notion of a player-centered training environment, however, minimal research has been published to support this claim. Clemente et al. 2012 said,

“However, the typical strategy of comparing approaches (i.e. analytical and ecological), methods, styles, strategies, or teaching procedures has consistently carried to inconclusive results, promotion, and unfair generalizations based on reductionist conceptions (Graca & Mesuita, 2007 in Clemente et al., 2012).

Interestingly, this research project was born from the idea that a quantification of a pedagogical approach (specifically, the constraints-led approach) could further aid player development initiatives.

Purpose of the Study

To compete at the highest level, a soccer team must attempt to organize themselves while disorganizing the opponent (Tamarit, 2014), however, in order to do this, the team on an individual and collective level must be able to interpret each game situation (tactical) and execute the correct motor action (technical). The idea is that in order to have professional players competing at high levels, their youth development process must appropriately and progressively teach them how to understand the game (tactical) and how to execute individual actions (technical) such as passing and dribbling to name a few.

The purpose of this study was to examine the constraints-led approach as it pertains to tactical-technical development in youth soccer players in comparison to the *reproductive style* coaching model. The *reproductive style* coaching model was chosen due to its relevance to 'traditional' coaching methods where the coach was the center of the learning process for the players. The idea is that under this paradigm, the players rely on the coach to provide them with information instead of analyzing and interpreting the environment (the game) on their own. Interestingly, Horst Wein eloquently expressed his view on player-centered (CLA) and coach-centered (reproductive) methods by stating,

“The traditional way of teaching and learning based on instructions which didn't allow the student or player to contribute actively to the solution of any problem needs to be changed. Instead, the coach must give space and time to his students to discover problems or game situations by themselves to allow them to perceive correctly, to collect data, to evaluate, to judge, and to organize the information, to

remember solutions, to come to conclusions, to imagine, to invent and create” (Wein, 2004).

The focus was on the manipulation of task constraints within the training session. In order to accurately assess “development”, small-sided games were measured using a game play observational tool that evaluated both quality of decisions and motor executions during gameplay (Turner and Martinek, 1992).

Due to the similarities of soccer and field hockey (both invasion sports), Turner and Martinek’s (1992) research was used as empirical support for the utilization of the game play observational instrument. In essence, three categories of behavior were coded including control, decision, and execution (Turner and Martinek, 1999). In order to quantify each category, a successful action (control, decision, and execution) earned one point while an unsuccessful action earned zero points. The purpose was to analyze the participants in a four versus four small-sided game to see the impact of the coaching methodology (CLA and Reproductive Style) on player development after eight training sessions. It was hypothesized that the constraints-led approach would lead to great tactical-technical development in youth soccer players in comparison to the reproductive coaching style.

Ultimately it was hypothesized that there would be a statistically significant difference between the players in the *constraints-led approach* group compared to the *reproductive style* group in all categories (control, decision, and execution). Secondly, it was hypothesized that the players in the *constraints-led* approach group would report greater enjoyment and enthusiasm for soccer in their post-experiment survey in comparison to the *reproductive style* group.

In addition to the quantitative analysis of the game performance, a survey was administered to the participants in an effort to compare the performance results to the opinions of the players. It was hypothesized that the players in the constraints-led approach group would report more enjoyment while training in addition to being more prepared to cope with the uncertainties during competition.

The target audience for the findings from this investigation is not limited to the novice, volunteer, and/or parent coach, but includes soccer governing bodies (federations), elite youth and professional coaches, and coaching educators. All of these groups and individuals directly or indirectly influence the player development process. Coaching practitioners and researchers should work together to evaluate and advance coaching methodological research.

Theoretical Perspective

A complex system in nature is composed of many different interacting components (Passos, Araujo, Davids, and Shuttleworth, 2008), and due to these ever-changing interactions, emergent behaviors occur. The behavior of a complex dynamical system emerges when the behavior of a single player becomes dependent on what neighboring players are doing and on what has been done before (Passos, Araujo, Davids, and Shuttleworth, 2008). The idea is that these player interactions lead to events that occur in a non-linear fashion, as the outputs are not entirely predictable (nor are they completely random) (Passos, Araujo, Davids, and Shuttleworth, 2008). In the team sport setting, each player's decisions and actions are 'constrained' by the specific interactions in the complex system (Passos, Araujo, Davids, and Shuttleworth, 2008). From this

viewpoint, non-linear pedagogy is the overarching theoretical perspective, and the constraints-led approach is the coaching methodology.

Research Question

The main research question addressed in this study is *“To compare the Constraints-Led Approach and the Reproductive Style coaching methodologies as it pertains to tactical-technical development in youth male soccer players.”* In order to assess the possible relationship between CLA and player development, both quantitative and qualitative data was collected. It was hypothesized that, the constraints-led approach would lead to greater tactical-technical development in youth soccer players compared to the reproductive coaching style.

Delimitations and Limitations

Delimitations. While coaching pedagogical approaches such as Teaching Games for Understanding (also known as Game Sense) have been utilized in past research (Turner and Martinek, 1995), the decision was made to analyze the CLA as there is a lack of empirical support of that pedagogical approach. Additionally, when utilizing the player observational tool as in Turner and Martinek (1992), the decision was made to disregard ‘shooting’ from the execution group. Instead, the two executions that were analyzed were passing and dribbling.

With specific regard to the participants, the decision was made to exclude ‘elite’ youth from the research, as gaining access to that population of players (youth Major League Soccer players) is extremely difficult. However, access to ‘lower’ level youth players was possible due to the researcher’s experience as an elite player and coach.

Limitations. The participants were selected utilizing random sampling after all of the youth clubs in the state of Washington that are 'affiliates' of the Seattle Sounders Academy. All of the club directors were contacted and asked to contact all of their teams born in 2004. In order to limit the possibility of a sampling bias, the teams had to respond by a certain date, and once the full list was set, two teams were randomly selected (each group consisted of 8 players and two players per team were saved as alternates in case of an injury.). Since all of the participants did not have the same prior coaching throughout their lives, there will be a period of adjusting to teammates, and ultimately 'successful' actions were influenced by this limitation.

Additionally, with regards to coaching, each group was coached by their regular coach, however, all of the coaches involved took part in a training process in order to learn the pedagogical approach proposed. The training took three weeks.

When analyzing the qualitative questionnaires, clear and concise questions were needed to ensure the young players fully understand what was being asked. With regards to their feelings about coaching methodologies, it's possible that prior coaching impacted their thought processes. For instance, a coach that the players' did not like as a person could have used the constraints-led approach, and subsequently improved them as players, but the players reported negative feelings about the approach due to past feelings about their coach.

Definitions of Terms

Several terms specific to this study are defined below.

Ecological Psychology – assumes a performer-environment mutuality and reciprocity, in which both combine to form a whole ecosystem (Araujo, Duarte, Davids, & Hristovski (2006).

Non-Linear Pedagogy – is predicated on a view of the learner as a human movement system, which is inherently non-linear in character (i.e. openness to surrounding information flows, capacity for self-organization, stabilities and instabilities, capacity for transitions in states of order (Davids, Bennet, & Newell, 2006 in Renshaw, Davids, Shuttleworth, & Chow, 2009).

Affordances – refers to a property of the environment, which can be detected as information to support an action (Gibson & Pick, 2000 in Renshaw, Davids, Shuttleworth & Chow, 2009).

Complex System – Consists of structurally and functionally heterogeneous components, which interact (generally informationally or/and mechanically) with varying intensities and spanning different spatio-temporal scales (Balague, Torrents, Hristovski, Davids, & Araujo, 2013).

Constraints-Led Approach – describes how acquisition of movement and decision-making skill is predicated on the influence of interacting performer, environmental and task constraints in sport (Chow et al., 2009 in Chow, Davids, Button & Renshaw, 2016)

Performer Constraints – refers to the unique structural and functional characteristics of learners and include factors related to their physical, physiological, cognitive, and emotional make up (Renshaw, Chow, Davids, & Hammond, 2010).

Environmental Constraints – refer to physical factors such as the surroundings of learners including gravity, altitude and the information available in learning contexts

such as amount of light or level of noise in a sports field (Renshaw, Chow, Davids, & Hammond, 2010).

Task Constraints – are perhaps the most important constraints for physical educators because of their significance in learning. The proficiency with which physical educators can manipulate task constraints like modifying equipment available to learners, or the size of the playing areas, setting relevant task goals in games or enforcing specific rules for performance can shape the emergence of learners’ behaviors in physical education (Renshaw, Chow, Davids, & Hammond, 2010).

Reproductive Style – has traditionally emphasized the repetitive attempts of learners to perform coach- or teacher-prescribed movement patterns (considered to be ‘optimal’) in isolated drills and decontextualized practices (Chow, Davids, Button, & Renshaw, 2016).

Chapter 2: Literature Review

Over recent years, there has been a great amount of information published with regards to soccer training organization strategies. In particular, Tactical Periodization and Structured Training have been widely discussed as two of most popular methodologies. Although the two training organization strategies originated in different countries (Tactical Periodization in Portugal and Structured Training in Spain), both strategies recognize importance of applying complex thinking to the sport of soccer (Mallo, 2015). The idea is that a team (system) “is placed within an environment (context) that will affect both its behavior and its performance (Moriello, 2003 in Tamarit, 2014). From this perspective, the coach (at all levels) is responsible for teaching their team to interpret the game in the same language, and subsequently make the optimal decisions and executions.

For instance, when Pep Guardiola was appointed as the head coach of Bayern Munich in 2013, he was challenged with teaching the German team a style of football that was quite different to what they were accustomed to. However, according to Lorenzo Buenaventura (Guardiola’s Fitness Coach at Bayern Munich), the Catalan coach progressively taught his team to read the game in the same language (Perarnau, 2014). Buenaventura said,

“Pep deals with new concepts by introducing them from the warm-up, the simplest passing exercises onwards. Today he’ll share a few details and then give them some more tomorrow. The day after that he’ll talk about how to choose what angle the body is at to receive a pass, then, next time, how to take the ball on the move, followed by how to practice passing off your weaker foot. Little by little the

players start to understand and assimilate and very soon it's coming easily and they're putting it all together at speed" (Perarnau, 2014).

From a broader point of view, the game of soccer includes many uncertainties such as the fans, weather, playing surface, and the bounce of the ball to name a few (Tamarit, 2014). Due to these uncertainties and oscillations between phases of order and disorder,

"it makes sense to think of the game as a random or semi-random system where you cannot precisely determine or calculate outcomes in advance. Football is a chaotic sport, and the factors that drive it are localized and unpredictable; they cannot be viewed in isolation" (Tamarit, 2014).

The idea is that this 'non-mechanistic' or 'systemic' perspective regarding the game of soccer provides a sound starting point for the application of the constraints-led approach to soccer coaching. The following sections describe the foundations of nonlinear pedagogy and a rationalization for the utilization of the constraints-led approach instead of the reproductive style.

Ecological Psychology

The foundation of ecological psychology is the "mutuality of the individual and his/her environment (Renshaw et al., 2009), and the idea is that the individual cannot be understood without reference to their specific environments (Renshaw et al., 2009). Interestingly, in team sports, "the environment could consist of other individuals such as teammates and opponents, as well as the laying surfaces and inanimate objects that define each specific performance context" (Renshaw et al., 2009). Although anecdotal, for many years Lionel Messi was receiving a great amount of criticism due to his perceived

'poor' performances with Argentina. Fans and media could not understand why Messi was not producing the same performance level with Argentina as he did with FC Barcelona. If such critics understood ecological psychology, they would have recognized and appreciated the fact that each team is a different 'system', thus the player's performances can fluctuate due to the different environments. When analyzing the game of soccer, utilizing the theories of ecological psychology as the starting point appears to be ideal.

One of the critical characteristics of ecological psychology is the notion of affordances. From this approach, the functional behaviors of performers are considered through the establishment of information-movement relationships (Araujo, Davids, Hristovski, 2006 in Travassos, Araujo, Davids, Vilar, Esteves, and Vanda, 2011). In a study by Travassos et al. 2011, the authors aimed to explain how defenders intercept passes in team sports. Interestingly, the authors suggested that

“it is possible defenders may use other sources of information available prior to the moment of the pass initiation, which would allow them to anticipate passing performance and enhance their action capabilities to intercept the ball”

(Travassos, et al., 2011).

The environment (game) is filled with information, and it appears the players who 'detect' those affordances the quickest will experience the most success. More specifically, the detection of affordances allows performers to decide how and when to act in order to achieve an intended goal (Araujo et al., 2006 in Travassos et al., 2011).

Non-Linear Pedagogy & Representative Task Design

As previously discussed in the definitions section, *non-linear pedagogy* revolves around the notion that the learner is a human movement system that is inherently non-linear, and subsequently open to information flows, self-organization, and stabilities and instabilities (Davids, Bennet, & Newell, 2006 in Renshaw, Davids, Shuttleworth, & Chow, 2009). More specifically, there are four dominant features of a non-linear system that must be understood. The four features that provide the framework for the distinction between linear and non-linear systems are *cause-effect proportionality*, *multi-stability*, *parametric control*, and *variability* (Chow et al., 2016).

According to Chow et al., 2016, *cause-effect proportionality* refers to the notion that small alterations in a system can lead to large changes within the system. For instance, if a basketball coach implements a restriction to a training exercise that forbids the players to play passes over shoulder height, then the attackers movement patterns must drastically change in order to position in open passing lines (Correa et al., 2014 in Chow et al., 2014). Next, *multi-stability* refers to the idea that one cause may have multiple behavioral effects (Chow et al., 2016). In essence, when constraints are manipulated, a system (learner or team) can “potentially be channeled towards multiple different patterns of behavior and not just guided to one outcome” (Chow et al., 2016). The third feature is referred to as *parametric control*, and the essence behind it is that

“Through parametric control, pedagogues, can help learners to be exposed to a constellation of different constraints in a particular learning task, increasing task variability and creating more opportunities to explore different function states of

organization in adapting to environmental and task constraints” (Chow et al., 2016).

The idea is that the scaling of task constraints like kicking distances or playing area can lead to changes of the interactions among the learners and environment in the learning context (Chow et al., 2016). The last feature is known as *variability*, and in this sense, variability refers to utilizing different surfaces, varied equipment, varying space, time and player numbers in team games during practice (Chow et al., 2016). More so, by manipulating variables, the coaches can help guide the players towards exploring more diverse movement solutions in a learning situation (i.e. training exercise) (Chow et al., 2016).

In conjunction with the four features of non-linear pedagogy, one of the main principles in this type of pedagogical framework is the notion of *representative learning design*. According to Chow (2010) in Chow et al., 2016, “learning needs to be situated in real-game performance contexts.” More specifically, according to this principle, the “acquisition of skills takes place when the learner is situated in the context of the learning environment and the development of ‘knowledge of’ (the environment) occurs as a consequence of the interactions between the learner and the environment” (Chow, 2010 in Chow et al., 2016). The idea is that by using ‘real-contexts’, the players and team can identify the affordances in the environment and then execute the ‘optimal’ response (action) for a specific situation.

Constraints Led Approach

The *constraints-led approach* is the center point of non-linear pedagogy, and the three constraints that the coach can manipulate are the performer, environmental, and

task. The idea is that “constraints are defined as providing the boundaries within which learners can explore and search for movement solutions afforded to each individual within a perceptual motor workspace (Davids et al., 2008 in Chow et al., 2016). More so, the foundation of the *constraints-led approach* “emphasizes the interactive role of decision-making, intentions, and cognitions with its theoretical roots based on ideas from nonlinear dynamics to explain how a performer is able to coordinate and control movements (Jirsa & Kelso, 2004 in Chow et al., 2016).

As previously mentioned, the three constraints include the performer, task, and environment. According to Chow et al., 2016, performer constraints can be defined as physical and physiological aspects of the performer such as height, weight, muscle-fat ratio, and genetic makeup to name a few. Environmental constraints are “physical and sociocultural in nature and are relatively time-independent (Chow et al., 2016). For example, environmental constraints could relate to ambient light, humidity, altitude, peer groups, and family support networks (Chow et al., 2016). Finally, task constraints are “probably the most important in developing movement skills,” and coaches can implement task constraints by manipulating the rules of the game, equipment used, the number of players involved, and playing areas (to name a few) (Chow et al., 2016).

Interestingly, in a study by Turner and Martinek (1999), the authors sought out to compare the technical approach (reproductive style) to the teaching games for understanding, and in the TGfU group, “the games were constructed so that a tactical problem would emerge for the students while they played” (Turner and Martinek, 1999). In essence, the coach manipulated task constraints in order to elicit learning about a specific tactical aspect of field hockey. The authors found that with regards to control of

the hockey ball, players in the games for understanding group were 14% more successful in controlling actions than the technique group (Turner and Martinek, 1999).

Similarly, in a study by Travassos, Araujo, Davids, Esteves, and Fernandes (2012), the authors sought to explore how interpersonal coordination tendencies of players in Futsal constrained performance of passing actions. Interestingly, at the conclusion of the study, the authors suggested “improvement of passing actions in team sports can be best enhanced under practice task constraints that allow players to explore spatial-temporal interpersonal relations with other players” (Travassos et al., 2012). From this perspective, by manipulating task constraints, the coach can create an environment with different affordances, and subsequently, the players will develop new interactions between themselves and the environment.

Reproductive Style

Due to the non-linear nature of a soccer game, it appears that the implementation of non-linear pedagogy instead of traditional or *reproductive style* to soccer training is needed to appropriately prepare each player and team for the unpredictable events that occurs in a match. Traditionally, sports coaches have operated under the assumption that the human brain acts like a computer, and each player executes a decision based on the stimulus-response approach during training (Passos, Araujo, Davids, and Shuttleworth, 2008). More specifically, the *reproductive style* emphasizes “repetitive attempts to perform coach- or teacher-prescribed movement patterns in isolated drills and decontextualized practices” (Chow, Davids, Button, and Renshaw, 2016). The problem with the traditional approach is that the training design is based on isolated actions,

while the game of soccer is comprised of situations that are never repeated in an identical way” (Passos et al. 2008). More so, Grehaigne and Godbout (2005) said,

“In a more commonly used learning approach one tries before anything else to teach students technical skills and to maintain order on the field, by use of formal groupings for instance. We are tempted to say that it is important, and maybe more, to get the players to optimally manage disorder.”

Due to the static nature of the *reproductive style*, the application and implementation of non-linear pedagogy appears to be an optimal methodology for developing tactical-technical proficiency in youth soccer players. The foundations of non-linear pedagogy are based on the idea that there are three constraints (task, environment, and performer) that bound players’ decisions and actions at every moment within a game (Passos et al. 2008). From that perspective, the coach can design or ‘constrain’ training exercises to “allow performers to search for alternative task solutions (improving their ability to cope with inherent performance variability) in dealing with unpredictability” (Passos et al. 2008). The idea is that by fostering a training environment that resembles competition, the coach can appropriately lead players toward tactical-technical development by fittingly manipulating task constraints (rules, field size, opponents, etc).

Summary

Traditional coaching methods are based around ‘isolated training’, and essentially treating the player in a mechanistic perspective. Thanks to the emerging research with regards to team sports and pedagogical approaches, coaches can utilize over arching ideas related to ecological psychology and non-linear pedagogy as a new starting point for developing intelligent soccer players and teams. More specifically, objective of this

study was to analyze the relationship between the *constraints-led approach* and tactical-technical development in youth soccer players, in comparison to the traditional coaching approach (reproductive style).

Chapter 3: Research Methods

After a thorough evaluation of the literature on the subject of nonlinear pedagogy, and in particular, the *constraints-led approach*, the work completed by Turner and Martinek (1999) will provide the empirical foundation for the research. In order to answer the research question, quantitative and qualitative data (triangulation) was collected from the analysis conducted on the two coaching approaches (constraints-led approach vs. reproductive style). In this research, the task constraint was manipulated in effort to assess the relationship between task constraints in soccer training and tactical-technical development in youth male soccer players.

Population

In order to collect data from “youth male soccer players”, the club directors in the Seattle area were emailed, asking if their U12 boys team would be interested in taking part in the study. Incentives were provided in order to entice the possible participants such as a new soccer ball and being entered into a raffle for Seattle Sounders FC tickets to games in the 2017 season. In the end, 24 U-12 male soccer players were needed for the study to take place (8 for constraints led, 8 for reproductive, 8 for control). More so, in order to avoid bias, random sampling took place as the possible participants had 8 weeks to confirm their participation, and two teams were randomly selected. The participants will provide the data by taking part in the 10 training sessions (2 tests and 8 “real” training sessions).

Data Collection

In the task constraint group, a series of training sessions (10) was executed, and of those practices, two (1 pre-test and 1 post-test) of them consisted of small-sided

games that evaluated the players in free game play (4v4). In the task constraint group, the coach designed two training sessions for a dribbling content and two for a passing content, and then the coach repeated those four training sessions in order to see if the players have absorbed and applied the content trained (the training session sequence: Pre-test, D1, P1, D2, P2 – Recall D1, P1, D2, P2, Post-test). In the reproductive style group, ten training sessions took place as well with pre-tests and post-tests, however, for the 8 training sessions, the coach created ‘technical’ focused sessions (4 on dribbling and 4 on passing) in any order that the coach wished. However, each session in the reproductive style group concluded with a small-sided game (4v4) lasting 10 minutes.

From a quantitative perspective, the pre-test and post-test small-sided games were measured utilizing a game play observational tool (Turner and Martinek, 1992) that evaluates both quality of decisions and motor executions during gameplay. In essence, three categories of behavior were coded, including control (technical), decision (tactical), and execution with regards to dribbling and passing. Conversely, on a qualitative perspective, the members of both groups completed a survey with regards to how they liked the coaching style, what they improved on as players, and what types of challenges they faced. By doing so, a clearer understanding of the constraints-led approach with regards to player development was had, both scientifically and theoretically.

Data Analysis

In order to stay congruent with past research, a similar analysis took place as Turner and Martinek (1999) with regards to the usage of either the analysis of covariance or analysis of variance. As previously mentioned, the actions were divided by control, decision-making, and execution. For a successful action, the players received a 1 and for

an unsuccessful action, the players received a 0. In essence, a former soccer coach who was trained utilizing the procedures independently coded the games.

Ethical Considerations

From an ethical perspective, each participant needed the approval from his or her parents by the procedure of informed consent. In the consent form, the participants confirmed they assume the medical risks of playing soccer. Also, with regards to confidentiality, they were informed that no player names will be released in the research and that the training sessions will be filmed with a camera.

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