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A Metacognitive Approach to Video Game Coaching

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A METACOGNITIVE APPROACH TO VIDEO GAME COACHING

by

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SYNTHESIS*

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* The Synthesis can take a variety of forms, from a position paper to curriculum or professional development workshop to an original contribution in the creative arts or writing. The expectation is that students use their Synthesis to show how they have integrated knowledge, tools, experience, and support gained in the program so as to prepare themselves to be constructive, reflective agents of change in work, education, social movements, science, creative arts, or other endeavors.

ABSTRACT

This synthesis paper details my journey as an action researcher to evaluate the role of metacognition in acquiring, maintaining, and extending performance in the online video game Team Fight Tactics (TFT). Metacognitive skills contribute towards optimizing practice and strategic adaptability, which are fundamentals for improving performance in TFT. As a TFT coach, I created a theoretical model for video game coaching that focuses on developing metacognitive skills as a mean to improve TFT performance. This metacognitive approach to coaching is the intervention in my action research project that will be evaluated.

I found that my model was able to help TFT players improve as metacognitive thinkers; using these skills to optimize practice, develop adaptability, and improve as TFT players. However, there are still flaws with the theoretical model of a metacognitive approach to coaching, specifically around developing training methods that is appropriate for deliberate practice.

Introduction

For decades, video games have provided both adults and children with an interactive form of entertainment. While playing video games is commonly viewed as a recreational activity, the rise of the Esports industry shows the potential of pursuing a career playing games professionally.

Esports, which is short for electronic sports, refers to the organized competitive scene for video games. Much like the NFL or the NBA, Esports provide competitors an opportunity to showcase their mastery of a game in tournaments that are usually broadcasted to millions of people worldwide.

The popularity of Esports competition has created a desire within the audience to improve their skills in the hope of competing. The gamers who participate in Esports competitions are the best of the best in their respective games. Most competitive games have some form of a ranking system which allows players to see a representation of their skill relative to other players. Gamers would often use the ranking system to set concrete goals and track their progress towards achieving that goal. This desire for gamers to improve creates an opportunity for skilled gamers to offer their services as a video gaming coach to guide others through their journey of mastery.

I am a video game coach for the competitive auto chess game Team Fight Tactics, or TFT. Auto chess is a genre of strategy games that feature elements from chess (Viana & Çakır, 2020). Just like chess, TFT is a strategic, turn-based game where most of the gameplay takes place in a virtual a grid that resembles a chess board. In TFT, eight players compete to be the last

player standing. To win in TFT, players must be able to draw upon cognitive skills to display competency in strategizing, resource management, adaptability, and decision-making.

As of writing this paper, I am coaching four players, hosting individual coaching sessions with each player once every other week. During a typical TFT coaching session, I would watch recordings of my student's games and give feedback regarding the performances. This process is often called VOD (video on demand) review. Through VOD reviews, players get to relive the experience of a past game, with the additional benefit of being able to pause recordings, reflect on decisions while having access to expert feedback from the coach. Each coaching session would take 90 minutes, which is usually enough time to watch and review two full games. It is important to clarify that while TFT is a competitive game with an established Esports scene, not all the players I coach aim for competitive or professional play.

Initially, I pursued coaching as a part of my own journey to mastering the game. Despite having a self-serving interest to motivate the start of my coaching journey, I am also invested in the development of the players I coach. And through the experience of coaching, I quickly found fulfillment watching the players I coach succeed and improve. For those reasons, I seek to develop competency as a video games coach.

To understand how I can develop competency as a video game coach, I reflected on the knowledge and experience that I gained as a student in the Critical and Creative Thinking program (CCT) at the University of Massachusetts Boston. One of the courses I took was a course in metacognition. Metacognition refers to having knowledge and awareness of one's cognition and cognitive processes (Flavell, 1979, pp.906-911). Through that course, I learned about the role of metacognition in a learning process, specifically with helping learners plan, regulate, monitor, and evaluate learning strategies.

I began thinking about the parallels between learning and practicing video games. While both processes involve the acquisition of knowledge, practicing video games also focuses on applying learning toward skill development. If metacognition helps learners learn, how does metacognition help a gamer learn to improve TFT performance?

I hypothesize that focusing on the development of metacognitive capabilities of the players I coach would lead to an improvement in their TFT performance. Further, I propose a theoretical model to accomplish this objective. This report contains the research I conducted to test my hypothesis and its theoretical model, and my documents my journey as a reflective practitioner in applying what I learned to my practice as a TFT coach. Eventually, I plan to use the knowledge I gathered from this inquiry to create a video game coaching curriculum that uses a metacognitive approach to learning.

To do so, I would need to answer the following questions:

1. What are the intersecting points between gaming and learning?
2. How can metacognition contribute to the process of acquiring, maintaining, and extending TFT skills? (Specifically with practice and cognitive adaptability?)
3. How can I enhance a player's metacognitive capabilities during video game coaching sessions?

Gaming, Learning and Metacognition

> "In a good computer or video game you're always playing on the very edge of your skill level, always on the brink of falling off. When you do fall off, you feel the urge to climb back on. That's because there is virtually nothing as engaging as this state of working at the very limits of your ability." (McGonigal,2011, pg.24)

The experience of playing TFT requires a player to apply problem-solving skills and strategic thinking to complete an objective while bounded by the rules defined by the game. As McGonigal described, a good game usually involves a challenge. Having the player fail at a certain task, could motivate that player to reattempt the task until the objective is met. Every time a player repeats a task, they can learn something new to help them get closer to reaching that objective.

The process of learning through experience is not unique to games; in fact, it has been widely studied for many years (Vygotsky, 1962; Kolb, 1984). Experiential learning is an approach to learning where the learner is directly engaged with what they are learning. However, a lot of the learning happens when the learner makes sense of the experience through reflection (Kolb, 1984).

In the context of playing video games, a player learns not only from the experience of engaging in a task, but also through reflection on the experience. When a player reflects on a video game experience, they should be thinking about the objective of the task and the strategies that they use to complete the task. Therefore, after attempting the task, a player would be able to evaluate the efficacy of their original strategy and adjust accordingly for the following attempts.

Metacognition plays a significant role in the process of experiential learning because to reflect on an experience, one would have to monitor, assess, and revise cognitive activity. Pintrich & Paul (2000) defined three elements of metacognition. The first is metacognitive knowledge, which refers to having knowledge of cognition. Next is metacognitive judgements and monitoring, which refers to the process of observing and evaluating how one performs a task. Finally, there is self-regulation and control, which refers to an individual's ability to set goals, strategize and regulate cognitive activities.

All three metacognitive elements are learnable skills that, when enhanced, can help an individual develop better learning habits.

I believe that developing a TFT player's competency with the metacognitive process can help that player extend TFT performance skill in two ways:

1. Optimizing Practice

   In TFT, a common approach to practice would be to practice through play. However, according to the experiential learning theory, a student must reflect on their experiences for learning to occur (source). Therefore, I hypothesize that by introducing reflection as a regular part of practice, a TFT player would be able to improve more effectively.

   Reflection is also key for practice because to consistently perform at a high level, a player should be able to monitor, evaluate, and revise both their strategy and practice habits. The use of metacognitive skills can enhance the quality of practice and preparation and therefore lead to improved performance.

2. Cognitive adaptability

While metacognitive reflection is helpful for improving practice and preparation between matches, metacognition can also elevate a player's performance in the middle of a match. I observe that the strongest performing players tend to be the ones who can quickly adapt into different situations. Players can do this by engaging in metacognitive reflection; recognizing the flaws in their past decisions, creating a plan to address those issues, and executing that plan. This is challenging to do in the middle of a match because it requires the player to simultaneously engage in this metacognitive process while trying to perform at a high level. Often, players are also not afforded much time or guidance to reflect during a match. Therefore, I believe that players who are experienced metacognitive thinkers, has an advantage of performing better within the pressure of an on-going match. This requires players to not only develop a habit of metacognitive reflection, but also fluency to be capable of reflecting on their decisions during a game.

Optimizing Practice:

Within the video game community, "practicing video games" is usually synonymous to playing games. The mindset of "The more you play, the better you will be at the game" is common among gamers and video game coaches as well. However, I believe that practicing TFT requires more than just the commitment to engage in practice, but also requires the use metacognitive skills to create effective practice habits that are beneficial to the gamer. Earlier we established that players are learning through experience when playing video games, however learning occurs when players make sense of the experience through reflection (Kolb, 1984).

The role of reflection is largely ignored within the gaming community. "The more you play, the better you get" mindset encourages gamers to focus on the quantity of practice, with

little regard to the quality of the practice and the progress being made. Without the reflection, the player is simply engaging in a series of mindless repetition, that does little to improve performance.

In addition to contributing very little towards improvement, a routine of play without reflection also encourages a habit of excessive playing. The experience of playing video games is highly engaging (McGonigal, 2011). That level of engagement is what a lot of educators are trying to capture and apply within different learning environments because learning that occurs within a motivating setting can enhance learning outcomes (Cordova et al., 1992). However, that motivational setting could also create a risk for gamers to play excessively and therefore develop habits of video game addiction or even video game burnout (Männikkö, Niko, et al., 2015, pp.281-288).

If a player's goal with video game coaching is to develop their competency in a video game, then the player must be able to engage in an effective practice routine that helps them develop competency while avoiding the risks of excessive play.

Creating an Effective Practice Routine: Deliberate Practice

The goal of the intervention, in relation to practice, is to create an effective practice routine with a balance between play and reflection. But what does an effective practice routine look like?

An effective practice routine should help a gamer develop the skills to achieve their goals. Skill in a competitive video game like TFT is measured objectively through rank. TFT uses a similar, ranking system as chess, where skill is measured quantitatively and relative to

other players in the form of an ELO rating. A TFT player's ELO rating relies on a player's performance during TFT matches. To perform well in TFT, a player would have to be fluent in a series of skills, mostly cognitive, such as perception, attention, memory, and reasoning. However, a player's ELO rating is a comprehensive measurement of performance in all those skills used in tandem.

Without a readily available way to track the progress of specific skills, players resort to using their ELO rating to track progress. While a player's ELO rating is reflective of their skill level of the game, using only ELO to track progress makes it difficult for a player to identify the specific weaknesses in a performance and work on making improvements. Therefore, I argue that a more focused approach to learning and practice is essential for an effective practice routine.

Deliberate practice can be defined as a systematic and structured approach to practice, with the goal of improving performance in a specific domain. Through a series of studies, researchers created a framework that distinguishes deliberate practice from other modes of practice. Ericsson (1996, pp. 21) defines the four conditions for deliberate practice: well-defined tasks, motivation to improve, access to informative feedback and opportunities for repetition and adjustment. I will explain each condition within the context of video game performance and explain what a coach can do to encourage deliberate practice.

1. Well-defined task

    Deliberate practice begins with defining a goal. Most of the people who are seeking video game coaching come prepared with a goal in mind. However, these goals

tend to be rather vague, most of them focusing on achieving a certain rank. However, deliberate practice calls for the learners to define and understand their goals on a deeper level. With support from the coach, learners should be able to describe and identify what performance should look like on the level of competency they are striving to achieve and begin to identify the skillset required to perform at that level. A well-defined task is then derived from the identified skillset, and represents a task that when practiced, would contribute to developing a specific skill and therefore an improvement in overall performance.

This may appear to be a complicated process and a daunting task for anyone to do, especially someone who has little experience with deliberate practice. However, the coach should be supporting the player as they go through this process. For example, a coach can use their expertise in a game to help players identify the skills required to perform at a certain level, increasing their metacognitive knowledge. Another example would be providing suggestions on which skills to improve and strategies to improve those skills. However, it is crucial for the coach to assume the role of a facilitator, with the goal of supporting a successful deliberate practice routine instead of directing one. This is because people who take initiative in learning, learn more and learn better than those who are passively taught (Knowles, 1975).

2. Motivation to improve

Players who seek coaching are usually already motivated to improve. The goal is to maintain the motivation throughout the process of deliberate practice. It is not uncommon for players to lose motivation. A key to preserving motivation during practice

is to find a balance of difficulty. For competitive games such as TFT, this is done automatically via the ELO ranking system. The ranking system matches individual players with opponents who share a similar ranking. This is done to ensure that a player is playing at the edge of their skill level.

It is essential to capture that balance within the well-defined practical task as well, ensuring that it is not too easy where improvement does not occur and not too difficult to make the learner frustrated and lose motivation. While a coach can directly motivate a player in their journey of improvement, coaches should also help students monitor their progress (Metacognitive monitoring and judgements) and form/adjust goals to create a challenging and engaging practice environment (Self-regulation and control).

3. Access to informative feedback

Video game coaches should provide informative feedback to students. Most video game coaching sessions are structured around a coach providing feedback on a player's performance.

With a metacognitive approach to coaching, a coach should also provide feedback on a student's ability to engage in deliberate practice. Doing so would help students develop metacognitive awareness about their competence as deliberate practitioners, and therefore help facilitate other elements of the metacognitive process.

Another source of informational feedback are game characteristics. This type of feedback is called system feedback. System feedback refers to the evaluation of the

players performance or user behaviour that is provided by the game or system. The most apparent form of system feedback is usually a rating or rank based on the user's behaviour that is given by the system at the end of a match. However, system feedback can be found throughout the game. For example, in TFT, if a player won their last four rounds consecutively, the player's in-game character would be engulfed in flames, which indicates that the player is performing well. Not all system feedback is easily recognizable, which is why I often observe players would fail to recognize the system feedback. Failure to recognize system feedback means that a player would not know to adjust their judgements and behaviors. A coach is responsible for helping their player notice and evaluate the system feedback, ensuring that the player is responding to the feedback with the appropriate judgement and behaviour. One way to do this is to create a guide sheet for a player.

Appendix A. is an example of a guide sheet that I used to coach one of my students, Player A. The purpose of the guide sheet is to encourage my students to develop a habit of reflection and awareness. The guide sheet is personally tailored to help each player achieve their specific goals. The data that the students are tasked to collect provides feedback for a student's current performance and increases their metacognitive knowledge. For example, Appendix A. tracks a player's gold usage throughout a TFT game. Gold is a resource in TFT, that a player can earn, accumulate, and spend to further benefit their position in a game. The amount of gold player A accumulates at a certain point of the game can limit the available strategies player A can use in future rounds of that same match of TFT. By giving Player A the task of recording and reflecting on his gold at that specific point, Player A is encouraged to think about the options he has with

the gold available to him. This provides Player A with the opportunity to adjust his strategy to perform better in that match. Player A would also develop a habit of noticing and reflecting on system feedback.

4. Opportunities for repetition and adjustments

While one of the goals with a metacognitive approach to coaching is to remove mindless repetition from a student's practice routine and reduce excessive play, I recognize that opportunities for repetition and adjustments comes through playing games of TFT.

It is important to mention that in TFT, it is difficult to find opportunities for repetition. This is because the outcome of a TFT game does not only depend on the decision that a player makes, but also the decisions of the seven opponents. Therefore, creating a structured routine of repeated practice is challenging within a live match because a player might not be able to be able to consistently recreate the specific scenarios that they want to practice. However, this process can be aided using the guide sheet.

The guide sheet in Appendix A would help a player engage in a repetitive practice routine by creating a structured method of data collection. The guide sheet was intended to organize the progress a player is making; therefore, a player can use that guide sheet to record and monitor progress, followed by making the necessary adjustments.

Understanding Limits in Practice

Deliberate Practice is not an easy process to experience. It takes a lot of effort, mental fortitude, and time to reach a level of expertise. Ericsson and Crutcher (1990, pp. 188-218) claims that ten years of deliberate practice is required to become an expert. However, engaging in deliberate practice can be very draining as it requires one to dedicate time and their full attention. Practicing for long periods of times can make practice unproductive, or even harmful. Earlier, the risks of excessive play and practice was established. Players who engage in excessive gameplay, even within a structured routine risk the consequences of video game addiction and burn out. Unlike activities that require physical movements, where an individual can recognize limitations when they experience fatigue or exhaustion; the signs are less clear in a sedentary activity like TFT.

Therefore, instead of trying to quantify a time limit for practicing games, I often encourage the players I coach to reflect on the effects of the practice on their development as a TFT player, but also the effect of the practice routine on their health and lives. Video game coaches should also be responsible for monitoring the habits of their player and actively look for signs of poor practice habits. Video game addiction and burnout does not occur overnight but is a result of continued poor habits.

Structuring Coaching Sessions Around Deliberate Practice

With my intervention, I wanted to design a coaching approach that supports the four conditions of deliberate practice while respecting the limits of practice. Instead of the traditional approach where coaching sessions revolves around VOD reviews, the focus of coaching sessions would be to establish a deliberate practice routine. This Requires regular meetings between the

coach and the student. I wanted to choose a frequency where the coach and the student would have the chance to meet several times, but fairly spaced apart between each meeting to ensure that there is enough time for the players to practice individually. I felt like meeting once every two weeks would be sufficient.

The intervention would involve multiple steps. The first meeting would involve the coach explaining the whole process of the intervention to the players. I chose to be fully transparent with this whole approach.

Then, I would work with the player defining goals, a well-defined task, and then a practice routine. Still in the first meeting, I would work with each player to develop a personalized guide sheet. While each guide sheet is personalized, it follows a similar template, meaning it won't take too long to finish.

Between coaching sessions, players would be responsible for their own practice, and filling in the guide sheet. The remaining coaching sessions would involve reflections and discussions around the efficacy of the practice routine and the progress of improvement. Both the player and I would be monitoring the progress of the practice routine, and if the practice routine is found to be ineffective, the coaching session would be used to make adjustments, or establish a brand-new practice routine. Similarly, if a player feels like they achieved their goals with a certain practice routine, then they can use the coaching sessions to establish new goals and practice routines.

Cognitive Adaptability:

Practice is essential in preparing a TFT player to execute strategies during a match. However, the outcome of a TFT match does not only depend on your ability to execute a specific strategy, but also the decisions you and your opponents make. On top of that, there is also an element of randomness and variance in every single match of TFT that is beyond the player's control. Each TFT match is dynamic and unique; therefore, a player would not find repeated success employing the same strategy across multiple games of TFT.

With the variance created by the game characteristics of TFT, one might wonder if TFT is a game of luck or if it is a game of skill. However, despite the natural variance in each individual match of TFT, the top 50 ranked players consist of roughly the same people throughout different seasons of the game. This is because the top players can perform consistently well in a changing, dynamic environment that is unique to each TFT match. Top TFT players not only develop the necessary knowledge and experience to effectively execute a variety of strategies through practice and preparation, but also display a fluency in metacognitive reflection to adapt.

So how can metacognition help TFT players become more adaptable? Cognitive adaptability allows TFT players to remain flexible when they encounter unexpected situations. A player's ability to reflect on their own thinking would allow that player to evaluate the current situation, understand how their past decisions led them to the current situation, and possibly adjust their decision-making process towards a more favorable outcome.

Cognitive adaptability refers to the ability to make effective decisions in a dynamic environment. Cognitive adaptability allows TFT players to make sense of existing opportunities and make the best decisions to secure a higher placement than their opponents.

Earlier I wrote that a coach is responsible for helping their player notice, recognize and evaluate the system feedback. However, outside of coaching sessions, players do not generally have access to coaching support during live games. Therefore, it is crucial for a player to be able to use system feedback to monitor their current performance and make effective adjustments to help them earn a higher placement in that match. It's the same concept as a chef preparing a meal without a recipe. If the chef were to frequently taste and adjust the seasoning of the dish throughout the cooking process, then the chef is more likely to produce a tasty, well-balanced dish.

While a coach is not always available to provide instructional support in all their student's matches, a coach can help a player develop into reflective learners who are comfortable with engaging in this metacognitive process. Cognitive adaptability, in the context of TFT, is a function of metacognitive awareness and knowledge. Being adaptable requires the player to first recognize the need to adjust their approach in a response to a dynamic environment. Then, a player's knowledge of the game affects their capacity to choose and execute an effective strategy. Therefore, I planned an activity called 'streamer mode'.

Streamer mode:

Streamer mode is a role-playing activity where gamers would articulate their thought process and reflection during an on-going match. The purpose of this activity is to help players

have a deeper understanding of their habits, the viability of certain decisions and strategies and an overall game knowledge.

Self-talk refers to one's internal dialogue in any given situation. Self-talk is an expression of one's thought process, and a function of metacognition and reflection (Carver and Scheier, 2008; Morin, 2018). According to a 2008 study, self-talk can serve an individual in many ways including: directing focus, increasing confidence, regulating effort, controlling cognitive and emotional reactions and even executing tasks (Theodorakis et al., 2008). To understand how this phenomenon can affect performing athletes, self-talk has been a topic of research within the field of sports psychology (Van Raalte and Vincent, 2017).

I chose to name this activity streamer mode because engaging in this activity requires players to imitate the actions of streamers. Streamers are gamers who broadcast themselves playing games, while narrating their thoughts or engaging with an audience. While streamers occasionally interact with and respond to their live audience, streamers would also provide narration during gameplay.

By narrating their thoughts, streamers (who are generally experts at the game they stream) are modelling their thinking to the audience. Therefore, watching streams is a common strategy for gamers to improve their own skills. However, narration can also benefit the streamer's performance. By articulating their thought process, they are creating a habit of noticing and reflecting.

TFT is composed of a series of rounds, and each round consists of two phases, the planning phase, and the battle phase. During the planning phase, players have the freedom to make decisions like selling units to make more gold, buying experience to strengthen a position

or players can even choose to do nothing. Each round begins with the planning phase, which lasts a total of 30 seconds. In the planning phase, players articulate the decisions they make and why they made those decisions.

After the planning phase ends, the battle phase begins, where players battle with an opponent. The battle phase is where players can observe outcome of the decisions they made in the previous planning phase. The outcomes that a player observes during the battle phase is the system feedback.

The activity is simple, students would simply narrate their thoughts as they play games of TFT. Through the streamer mode activity, students are developing a habit where they are consciously monitoring their thinking as they play the game of TFT. This would help a player better understand the effects of certain decisions, process that information, and use it to guide future decisions. A repetition of this process would help players engage in this process more fluently during live matches. Studies show that the ability to monitor can be developed through training and practice (Delclos & Harrington, 1991, pp. 35-42).

Players are also encouraged to monitor the fluency of their narration. The ability to narrate fluently relies on a player's comprehension of the event they are narrating, in this case their game knowledge. By having the players narrate their games, players would tend to notice situations when they struggle to articulate their thoughts. Understanding why they struggle to do so can help players or their coaches identify gaps in game knowledge and work towards improvement.

Action Research:

The goal of my synthesis project is to improve my approach to TFT coaching, including how TFT players are coached to yield the best results for skill extension. Currently, there is not a lot of research regarding this specific topic, therefore approaching this investigation with action research is an opportunity for me to diagnose the issues I have with the current approach to coaching and identify a new path forward.

Action research is an iterative process where researchers engage in a cycle of observing, reflecting, acting, evaluating, modifying, and then moving towards a different direction; either with the practice that is being investigated or perhaps another cycle of action research, using the findings of previous cycles to inform new investigations (McNiff & Whitehead, 2011, pp. 8). The action research process is demonstrated in the Figure 1.

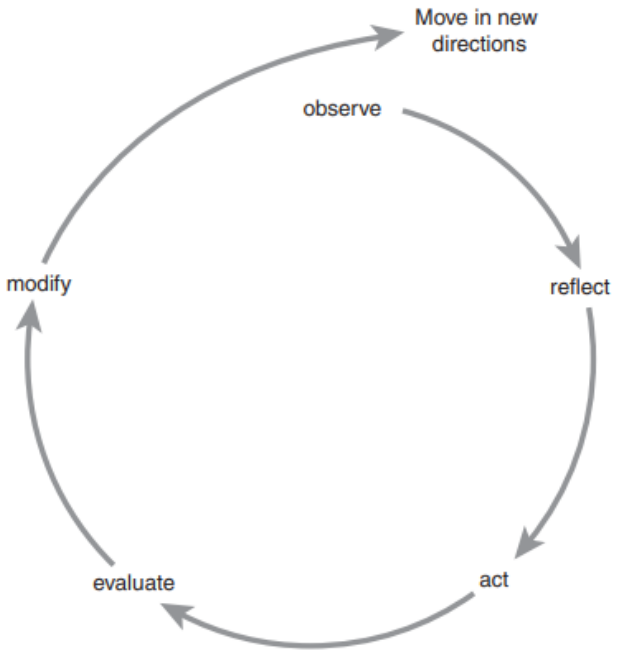

Figure 1. Action Research Cycle (McNiff & Whitehead, 2010, pp. 9)

This paper focuses on the implementation and evaluation of the first cycle of my action research project. With the first cycle, I don't expect to immediately find the ideal approach to TFT coaching, but I hoped that the insights that I learn could help me better understand the issues around TFT coaching and provide a new path forward for further investigation. The purpose of the first cycle of action research is to investigate how TFT players would respond to a different approach of TFT coaching.

As a part of the CCT program, I enrolled in an action research course. Throughout that course, I had the opportunity to learn about the process of action research while working on this project. One of the tools I was introduced to in this course was called the evaluation clock, which is a framework designed to help researchers look ahead and design a way to evaluate their work. Upon using this framework, I began thinking about who I am trying to influence, what I am evaluating, what I can do with the findings, and which values I should consider.

After some reflection, I realized that TFT coaching, as a practice, exists to meet the demand of players looking to improve their TFT skills. Therefore, the most important value to consider would be the TFT players who seek coaching services. So, I began planning the first cycle of the action research project.

The first cycle of the action research is a month-long intervention, investigating the efficacy of strategies that I developed to optimize practice and develop cognitive adaptability through TFT coaching and how students respond to this different approach to coaching. The participants of this intervention consist of the students that I am currently coaching. I was fully transparent with the players I coach with what I am investigating and their roles within the study. With the first cycle, I am evaluating both the outcome and the process of the intervention. I evaluated:

1. Student's growth as metacognitive thinkers

   To evaluate a player's progress as metacognitive thinkers, I provided a 5-point Likert scale self-assessment questionnaire (Appendix B) for each of my players to fill out every other week, for a total of three times for the first cycle. I created the questionnaire based on Pintrich's three elements of metacognition (Pintrich and Paul, 2000). By comparing the cumulative score of self-assessments conducted by the same player in multiple instances, I can see the development of metacognitive habits.

2. Student's growth as TFT players

   To evaluate a student's growth as a TFT player, I evaluated their overall progression using the ELO ranking system and measured their progress with their individual deliberate practice routine. I measured the player's progress when performing their individual well-defined task quantitively through the guide sheets.

3. Student's feedback to the approach/ process

   I encouraged the players I coach to reflect on their experiences with this coaching approach and provide feedback in a plus-delta format. The players are asked to give feedback on the process at the midpoint of the intervention and once again at the end.

The first two evaluations would allow me to judge if the efficacy of the interventions. For my intervention to be effective, my intervention would have to help the players develop into better TFT players and metacognitive thinkers. The third evaluation would help me assess how players respond to this different approach to TFT coaching.

Discussion on Findings:

Having the opportunity to implement these strategies in a real coaching environment allowed me to make the evaluations outlined in the previous section. The first evaluation aims to understand the student's growth as metacognitive thinkers. Table 1 shows the cumulative scores from the self-assessment (appendix B) conducted at different stages of the intervention.

Table 1. Evaluation 1

	Start of Intervention	Mid-point	End of Intervention
Player A	24	28	32
Player B	15	29	30
Player C	17	24	35
Player D	25	25	32

The findings suggests that the intervention helped players develop habits of metacognitive thinking. All four players saw an increase in the cumulative score of their metacognitive assessment as the intervention progressed.

One of the questions in the questionnaire is: "I am confident in my ability monitor and evaluate my performance during match and adjust strategies towards a more favorable outcome.". This question aims to evaluate a player's progress in reflecting on an ongoing game and using the reflective inquiries to adapt to the current game. All four players reported an increased score as the intervention progressed, which suggests that they became more adaptable players.

Reading the responses from the plus-delta feedback form, the players credited the streamer mode activity, the guide sheets, and the coach's involvement as their means of enhancing their metacognitive capabilities. It is important to note that this is a self-reported assessment, meaning there is room for personal bias. While there is a trend with the findings across all four players, each player saw a varying degree of the change in their cumulative scores and saw different areas of improvement within the questionnaire.

The purpose of the second evaluation is to understand if the intervention helped the students develop into better TFT players. Table 2 shows the findings of the evaluation.

Table 2. Evaluation 2

	ELO Rating	Deliberate Practice
Player A	Increased (+230 LP)	No
Player B	Increased (+432 LP)	Yes
Player C	Increased (+812 LP)	No
Player D	Increased (+245 LP)	No

The first measurement for this second evaluation is the change of the player's ELO rating before and after the intervention. A player's ELO rating is attached to their TFT game accounts and visible to the public. All four players saw an increase in their ELO rating; however, some players saw a greater improvement than others. This is demonstrated by looking at each players overall LP gain. I chose not to evaluate the specific LP gains for each player because it is an unfair comparison.

Each of participants began the intervention in varying skill levels, which may contribute to their ability to improve their overall ELO rating. Higher skilled players would be disadvantaged in an evaluation of LP gains because they have less room to improve in that category compared to a player with a lower ELO rating.

Each player was also observed on their experience with trying to engage in deliberate practice. By observing the goals set, their practice routines, and the results of their guide sheet, I judge whether a player can engage in deliberate practice, and if the deliberate practice contributed to TFT skill acquisition. If a player was able to create a practice routine and see an improvement in their performance of a well-defined task, then I can conclude that deliberate practice worked. This is indicated with a "Yes" on the table 2. If a player was able to create a practice routine but did not see an improvement in their performance of a well-defined task, or was unable to define a practice routine, then I conclude that deliberate practice did not work. This is indicated with a "No" on table 2.

Despite all players seeing an improvement in their overall ELO rating, only one was able to successfully engage in deliberate practice. This suggests that while the intervention did help the students become better TFT players, the role of deliberate practice in that process remains unclear. To have a better understanding of these results, it is important to understand why the three players were unable to engage in deliberate practice. This is partially answered by analyzing the third evaluation.

The third evaluation aims to understand how TFT players respond to a different approach to coaching and is evaluated using plus/delta feedback. Player B, the only player who found success with deliberate practice, reported that he believed the practice routine did help him become a better TFT player overall.

Reading the responses for the other three players, I began to understand that the players struggle to find a repeatable, well-defined task necessary to engage in deliberate practice. With this intervention, I worked with each player to develop a practice routine and assess the progress. However, the findings suggested that my approach to developing a training method required for deliberate practice, was flawed.

Future Directions:

Reflecting on the results of my findings encouraged me to do further research regarding deliberate practice, specifically around developing training methods. Through my research, I discovered that the training methods used in deliberate practice are unique for specific domains.

Deliberate practice aims to refine a player's mental representation of performance through the repetition of training methods. However, mental representations are "domain specific" with no crossover (Ericcson, 2016, pp. 60). Unfortunately, there has been little to no research regarding proper training methods within the domain of TFT.

Establishing effective training methods with TFT would allow me to better understand if deliberate practice is a viable approach for coaching TFT. The results of player B indicated that deliberate practice was helpful for improving a specific TFT skill and therefore overall TFT performance. While one success story is not nearly enough for me to form a conclusion regarding the role of deliberate practice in TFT coaching, it did inspire me to inquire further. Perhaps the focus of my next cycle of action research is to establish effective training methods in TFT.

While there may not be any effective training methods established within the domain of TFT, I imagine that every domain specific skill started out this way too. Therefore, there must have been a process where people research and discover these specific training methods. This was not heavily focused on within my first cycle of action research, but perhaps could be the focus of the next cycle of action research.

Future Cycles of AR would also aim to use the feedbacks that I received through the third evaluation, to modify certain aspects of my approach, as well as address some limitations in the overall research process. But… I think I will save that for another time.

Conclusion:

I began this project because I recognized a problem that I wanted to address. So, I devised a hypothesis to address that problem, and started an action research project. I hypothesized that focusing on the development of metacognitive capabilities of the players I coach would lead to an improvement in their TFT performance and introduce a theoretical model to accomplish this objective.

True to the nature of an action research project, at the end of the first cycle, I found new questions that needs answering. The goal of the first cycle of action research was to investigate the efficacy of my proposed strategies and understand how students respond to this approach to coaching. I felt that I accomplished that.

Through this project, I was able to better understand the similarities between gaming and learning, the role of metacognition in the process of acquiring, maintaining, and extending TFT skills, and how to enhance a player's metacognitive capabilities during video game sessions.

I created a theoretical model of a metacognitive approach to coaching, tested the approach with four TFT players, and evaluated the model. I found that my model was able to help TFT players improve as metacognitive thinkers; using these skills to optimize practice, develop adaptability, and improve as TFT players. However, there are still flaws with the theoretical model of a metacognitive approach to coaching, specifically around developing training methods that is appropriate for deliberate practice. Despite ending the first cycle with these issues, the beauty of an action research project is how we can use unresolved inquiries to guide future cycles of research. That is what I intend to do with this project, following a trail of inquiries down a path where I can continue to grow as an action researcher and a TFT coach.

Works Cited:

Carver, Charles S., and Michael F. Scheier. *On the Self-Regulation of Behavior*. Cambridge University Press, 2008.

Cordova, Diana I., and Mark R. Lepper. "Intrinsic Motivation and the Process of Learning: Beneficial Effects of Contextualization, Personalization, and Choice." *Journal of Educational Psychology*, vol. 88, no. 4, 1996, pp. 715–730., https://doi.org/10.1037/0022-0663.88.4.715.

Delclos, Victor R., and Christine Harrington. "Effects of Strategy Monitoring and Proactive Instruction on Children's Problem-Solving Performance." *Journal of Educational Psychology*, vol. 83, no. 1, 1991, pp. 35–42., https://doi.org/10.1037/0022-0663.83.1.35.

Ericsson, Anders, and Robert Pool. "Chapter 3 Mental Representation." *Peak: How All of Us Can Achieve Extraordinary Things*, Vintage, London, 2017, pp. 50–83.

Ericsson, Karl A, and Robert J Crutcher. "The Nature of Exceptional Performance." *Lifespan Development and Behaviour 10*, 1990, pp. 188–218.

Ericsson, Karl A. "The Acquisition of Expert Performance: an Introduction to Some of the Issues." 1996.

Flavell, John H. "Metacognition and Cognitive Monitoring: A New Area of Cognitive-Developmental Inquiry." *American Psychologist*, vol. 34, no. 10, 1979, pp. 906–911., https://doi.org/10.1037/0003-066x.34.10.906.

Knowles, Malcolm S. “Self-Directed Learning: A Guide for Learners and Teachers.” 1975.

Kolb, David A. *Experimental Learning: Experience as the Source of Learning and Development*. Prentice-Hall, 1984.

Männikkö, Niko, et al. “Problematic Digital Gaming Behavior and Its Relation to the Psychological, Social and Physical Health of Finnish Adolescents and Young Adults.” *Journal of Behavioral Addictions*, vol. 4, no. 4, 2015, pp. 281–288., https://doi.org/10.1556/2006.4.2015.040.

McGonigal, Jane. *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*, Vintage, London, 2012, p. 24.

McNiff, Jean, and Jack Whitehead. *All You Need to Know about Action Research*, SAGE, London, 2011, pp. 8–9.

Morin, Alain. “The Self-Reflective Functions of Inner Speech.” *Oxford Scholarship Online*, 2018, pp. 276–298., https://doi.org/10.1093/oso/9780198796640.003.0012.

Pintrich, Paul R. “The Role of Goal Orientation in Self-Regulated Learning.” *Handbook of Self-Regulation*, 2000, pp. 43–97., https://doi.org/10.1016/b978-012109890-2/50043-3.

Theodorakis, Yannis, et al. “Self-Talk: It Works, but How? Development and Preliminary Validation of the Functions of Self-Talk Questionnaire.” *Measurement in Physical Education and Exercise Science*, vol. 12, no. 1, 2008, pp. 10–30., https://doi.org/10.1080/10913670701715158.

Van Raalte, Judy L., and Andrew Vincent. "Self-Talk in Sport and Performance." *Oxford Research Encyclopedia of Psychology*, 2017, https://doi.org/10.1093/acrefore/9780190236557.013.157.

Viana, Bhernardo, and Gökhan Çakır. "What Is an Autobattler (or Autochess) Game?" *Dot Esports*, Dot Esports, 6 June 2020, https://dotesports.com/news/what-is-an-autobattler.

Vygotsky, Lev. "Thought and Language." 1962, https://doi.org/10.1037/11193-000.

APPENDIX A: PRACTICE GUIDE SHEET

Game	Gold at 2-5	Gold on Board	HP at 2-5	Placement	Composition
1	30	6	76	2	Debo Draven
2	31	8	64	8	Striker Irelia
3	34	7	72	3	Socialite Irelia
4	39	5	64	7	Socialite Kha
5	40	5	68	4	Talon Reroll
6	52	7	70	3	WW Reroll
7	45	12	78	3	Innovator Jayce
8	32	7	64	5	Senna Reroll
9	33	4	74	4	Bodyguard Jhin
10	35	8	79	3	Bruiser Renata
11	36	12	75	2	Yordles
12	31	12	72	1	Striker Irelia
13					
14					
15					
Average:	36.5	7.75	71.3333333	3.75	

APPENDIX B: METACOGNITIVE SELF-ASSESSMENT

Listed below are statements about metacognitive skills. On a scale of 1-5 (1: not confident and 5: highly confident) how accurate are the statements.

Statement	1	2	3	4	5
I am aware of my strengths and weaknesses as a player					
I understand the differences between the player I am now and the player I want to become					
I set realistic, appropriate, and specific goals					
I am confident that I can plan a deliberate practice routine to meet my goals					
I regularly ask myself if I am meeting my goals					
I am aware when practice/ playing is negatively affecting my life					
I am confident in my ability to assess the efficacy of my practice, and make the necessary adjustments					
I am confident in my ability monitor my performance during match, and pivot/ adjust strategies as I go					