Self-regulation of learning and the performance level of youth soccer players
Toering, Tryntsje Tsjitske

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Introduction

Soccer is one of the most popular sports in the world, with 270 million people active in the sport according to FIFA’s Big Count 2006 (FIFA, 2006). Over 38 million players were registered at national soccer associations in 2006 (FIFA, 2006). In the Netherlands, more than 1.1 million players were registered at the Royal Netherlands Football Association (KNVB) in the 2008/2009 soccer season, over 1 million male and 112,681 female. That is almost 7% of Dutch population. In the same season, there were 604,052 youth soccer players, of which 536,521 were male and 67,531 female (KNVB, 2010). Recently, the Dutch national soccer team played the World Cup final, that was watched by more than 12 million people in the Netherlands (NOS, 2010). The 2010 Dutch national World Cup squad went through many developmental stages before reaching their world-class status. A relevant question is, therefore, why did these players make it to this level, while others failed?

Talent identification and development has become increasingly important in the million-dollar business of association football. Only a small number of youth academy players succeed in becoming professionals (e.g., Siebelink, 2008). This indicates that it is important to look into variables that are linked with players’ development. Recently, many studies have been conducted that investigated aspects of talent development in soccer (e.g., Huijgen, Elferink-Gemser, Post, & Visscher, 2009; Kannekens, Elferink-Gemser, Post, & Visscher, 2010; Roescher, Elferink-Gemser, Huijgen, & Visscher, 2010; Sedano, Vaeyens, Philippaerts, Redondo, & Cuadrado, 2009; Vaeyens, Lenoir, Williams, Philippaerts, 2008). The aim of the present research project was to provide more insight into psychological variables that were thought to be associated with youth soccer players’ development. The thesis focused specifically on self-regulation of learning, which has been suggested to help individuals learn more effectively and which has received a great deal of attention in research on academic achievement (e.g., Zimmerman, 2006, 2008). It was thought that effective learning may explain differences in performance level among youth soccer players. Findings of the present thesis could provide evidence for the relationship between a psychological variable (i.e., self-regulation of learning) and performance level in soccer. Furthermore, results contribute to knowledge about talent identification and development in soccer and in other sports and domains as well. The terms of “football” and “soccer” are often used interchangeably. In this thesis, the term “soccer” will be used.
Talent development in soccer

The main framework guiding research on the development of expertise in sport is the deliberate practice approach (e.g., Ericsson, 1996; Ericsson, Krampe, and Tesch-Römer, 1993; Starkes & Ericsson, 2003). The deliberate practice approach presumes that expert performance is associated with the amount of domain-specific deliberate practice that performers accumulate during their careers. Several studies have provided evidence for this proposition in different fields, such as sport (e.g., Ford, Ward, Hodges, & Williams, 2009; Helsen, Starkes, & Hodges, 1998; Ward, Hodges, Williams, & Starkes, 2007) and music (e.g., Ericsson et al., 1993; Krampe, 1994). Deliberate practice has been defined as structured activities with the primary goal of improving performance (e.g., Ericsson et al., 1993). Ericsson et al. (1993) indicated that it generally takes at least 10 years, or 10,000 hours, of deliberate practice to become an expert in any domain. Suggesting practice history to be the main variable explaining expertise, deliberate practice theory seems to question the use of the concept “talent” that includes a sense of predetermined characteristics being the origin of expertise (e.g., Howe, Davidson, & Sloboda, 1998; Starkes, 2000; Simonton, 2001).

A definition of talent widely used in research literature is the one proposed by Howe and colleagues (1998; pp.399-400), in which talent is defined as follows: “(1) it originates in genetically transmitted structures and hence is at least partly innate; (2) Its full effects may not be evident at an early stage, but there will be some advance indications, allowing trained people to identify the presence of talent before exceptional levels of mature performance have been demonstrated; (3) These early indications of talent provide a basis for predicting who is likely to excel; (4) Only a minority are talented, for if all children were, there would be no way to predict or explain differential success; Finally, (5) talents are relatively domain-specific.” Howe and colleagues discussed this talent definition, reviewing literature on nature and nurture views. They concluded that there is research evidence supporting criteria number 1 and 4, but criteria 2, 3, and 5 are not met, while these
are the criteria that practitioners use to justify selectivity and discrimination.

Simonton (1999, 2001) points out that the definition of talent has been overly simplified and that it should be given a systematic and scientific appraisal. He proposes a definition of talent as emerging from a multidimensional, multiplicative, and dynamic process. Talent is suggested to be built up of multiple components (e.g., physical, cognitive, etc.) that all have their own rate of development. It emerges when these components are combined into a particular configuration. For talent to emerge in a domain, some components may be more essential than others, different configurations of components may yield the same talent, and talent is difficult to predict. Simonton's (1999, 2001) approach is therefore different from common approaches, in which talent is investigated using linear, additive models. The assumption that all components have their own rate of development implies that there may not be early indicators of talent, as the emergence of talent depends on configurations of components in which one component may mature at a different time than another. It also means that different individuals may display the same talent at different ages and that a late-bloomer may overtake an early-bloomer. The development of talent is difficult to predict, because how the configuration of talent components develops over time depends on the interaction between the components' innate paths of development and the environment, in which practice plays an essential part.

Although it is probably too complicated to use as a framework for talent research, Simonton's (1999, 2001) approach seems to be more realistic than both the overly innate or environmental approaches. It takes into account that the development of talent is dynamic, complex, and occurs in an environment. It can also be connected with one of the main problems in soccer talent identification and -selection: The relative age effect. Relative age is the age of a player relative to the selection cut-off date of his age category (e.g., Cobley, Baker, Wattie, & McKenna, 2009; Helsen, Starkes, & Van Winckel, 1998, 2000). In soccer, the selection cut-off date is January 1st, meaning that a player born in February is born early relative to the cut-off date and a player born in November is born late. When annual age groups are used, as is the case in soccer, it means that a player born in January is almost one year older than a teammate born in December. This indicates that there may be large differences in maturation and experience, while both players play for the same team. Physical and psychological maturation, and experience may be the main reasons why players born early relative to the selection cut-off date perform better than relatively younger peers, as maturation and experience may cause them to have more favorable configurations of what Simonton (1999, 2001) calls talent components. This means that players born “favorably” may have a better chance to become selected for youth academy or representation teams. Research has revealed that this is indeed the case: Players born early relative to the selection cut-off date were by far overrepresented in youth selection teams, indicating that youth soccer players seem to be selected primarily on the basis of variables related to maturation and experience (e.g., Cobley, Shorer, & Baker, 2008; Cobley et al., 2009; Helsen et al., 1998, 2000; Helsen, Van Winckel, & Williams, 2005; Simmons & Paull, 2001). Furthermore, significantly more selected soccer players have been found to be early mature.
Self-regulation of learning and the performance level of youth soccer players

Chapter 1

The phenomenon that players born early relative to the cut-off date of a selection year are by far overrepresented in selection teams is also known as the relative age effect (e.g., Cobley et al., 2009; Helsen et al., 2005). The relative age effect may have an extra impact on the development of youth soccer players.

As research following the deliberate practice approach has shown the importance of practice to attain expert levels of performance (e.g., Ford et al., 2009; Helsen et al., 1998; Ward et al., 2007), the relative age effect may have a more noticeable impact on the development of youth soccer players. Youth academies provide resources such as high-quality coaching and training facilities (e.g., Stratton, Reilly, Williams, & Richardson, 2004). Therefore, in accordance with the deliberate practice approach, selected players may get more opportunities to make progression (e.g., Ward et al., 2007; Ford et al., 2009). The existence of relative age effects in soccer implies that maturation and experience are important underlying factors of performance on which players are selected. It could be argued that youth academy players are more promising than others, because relatively more youth academy players become professional soccer players compared to the ones who spend their youth soccer years at a regular club. At FC Barcelona and Real Madrid, for instance, 52.5% and 43.0% of players in the 2009/2010 squad had been trained at the same club for at least three years between the ages of 15 and 21 (Poli, Ravenel, & Besson, 2010). However, following Simonton’s (1999, 2001) approach, the development of talent is hard to predict, even if it would be possible to reliably measure each talent component. Therefore, given the relative age effect, more youth academy players becoming professionals may primarily be an effect of the high-quality learning environment that youth academies provide as opposed to selected players having more future potential to start out with.

Given the presence of relative age effects (e.g., Cobley et al., 2009, Helsen et al., 2005) and the different development rates players may have (e.g., Abbott, Button, Pepping, & Collins, 2005; Phillips, Davids, Renshaw, & Portus, 2010; Simonton, 1999, 2001), it is well possible that many potential professional soccer players are overlooked by or released from the soccer talent identification and –development system.

In line with this argument, Abbott et al. (2005) pointed out that current talent identification systems overemphasize variables associated with maturation and experience, meaning that many promising players may be overlooked. They stated that developmental processes typically are non-linear and that performance becomes unstable during developmental transitions that performers make through their careers. Therefore, they argued, the timing of selection procedures plays an important role in talent identification. Abbott and colleagues suggested that the key variable to successful transition to the next stage of development is players’ ability to cope with these unstable transition periods in their development, and that players should be monitored on the psychological variables that account for this coping ability. Self-regulation of learning may be one of these psychological variables, because it is suggested to help players choose appropriate learning strategies for specific learning situations (e.g., Zimmerman, 2006, 2008). Thus, players who actively engage in their learning are thought to be able to use a broader range of strategies. In this manner, self-regulated learning may...
cause them to be more flexible in handling the instability of going from one learning or developmental stage to the next.

**Self-regulation**

Self-regulation is presumed to involve processes that enable individuals to exert control over their thoughts, feelings, and actions (Baumeister & Vohs, 2004). It is essential for psychological functioning, as it allows individuals to adapt to their social and physical environment (Schmeichel & Baumeister, 2004). Self-regulation includes processes that have evolved to extend the range and flexibility of human behavior, making it possible for human beings to override counterproductive responses. For self-regulation to occur, one needs a sense of self-awareness and, if other people are involved, the ability to infer the mental state of others (Baumeister, 2005). Self-awareness enables people to reflect on their actions and understand whether their actions meet personal standards and beliefs as well as group standards. The ability to infer the mental state of others, also known as the capacity to have theory of mind, enables people to understand and cooperate with others, and to interpret their behavior. Evidence from neuro-imaging studies suggests that a great deal of self-relevant and other-relevant information is processed in the medial prefrontal cortex of the brain (Krendland & Heatherton, 2009). As the ability to self-regulate is located in an area of the brain that developed relatively late in evolution, this ability is thought to be one of the features that distinguishes human beings from animals (e.g., Baumeister, 2005).

The concept of self-regulation has been studied in relation to many different topics, such as crime and violence, alcoholism, behavior change, learning, emotional control, and attentional control (e.g., Baumeister & Vohs, 2004; Boekaerts, Pintrich, & Zeidner, 2005; Percy, 2008; Scott, Beevers & Mermelstein, 2008). Self-regulation processes are supposed to bring about positive outcomes. When self-regulation fails, however, control over one's behavior breaks down, which likely leads to negative outcomes (Baumeister, 1997). Baumeister (1997) proposed that there are two forms of self-regulation failure: underregulation and misregulation. The first refers to the self failing to make an effort to change its response and produce the best outcome, whereas the second refers to the self making an effort to change its response, but the change does not lead to the best outcome. The latter indicates that there may also be a downside to the use of self-regulation processes.

**Self-regulation of learning**

Self-regulation in the context of learning has been suggested to refer to self-directed processes that enable learners to transform their mental abilities into performance skills (Zimmerman, 2008). Self-regulated learners are perceived as individuals who proactively rather than reactively approach their learning tasks. This indicates that they show personal initiative, perseverance, and adaptive skills, originating from favorable metacognitive strategies and motivational beliefs (e.g., Zimmerman, 2006, 2008). Metacognition refers to thinking about one's own thinking and includes processes such as planning and self-monitoring (e.g., Hong & O’Neill, 2001). Self-regulation processes have been proposed to not immediately produce high levels of expertise. These processes are thought to help people acquire knowledge and skills more effectively (Zimmerman, 2006). Self-
regulated learners may therefore get more out of their potential, irrespective of the learning domain. For instance, self-regulation has been found to be positively related to achievement in multiple domains, such as sports, music, and academia (e.g., Anshel & Porter, 1996; Cleary & Zimmerman, 2001; Kirschenbaum, Ordman, Tomarken & Holtzbauer, 1982; Kitsantas & Zimmerman, 2002; Nielsen, 2001; Pintrich & De Groot, 1990). Furthermore, several studies have shown that successful learners display more effective metacognitive strategy use and stronger motivational beliefs (e.g., Boekaerts et al., 2005; Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990). It has been proposed that underperformance among gifted students is associated with lowered self-regulated learning capacities (Risemberg & Zimmerman, 1992). Furthermore, intervention studies have shown promising results, in that self-regulation interventions helped students increase their math and reading performance and helped them correct judgments of their knowledge of learning tasks (e.g., Cleary et al., 2008; Housand & Reis, 2008).

In addition to academic achievement, self-regulation of learning has been found to be associated with achievement in sport. Chen and Singer (1992) suggested that successful athletes self-monitor their progression; they detect discrepancies between their current and potential level of achievement and self-regulate their efforts to improve performance. Furthermore, it has been shown that self-regulation failure harms athletic performance (e.g., Anshel & Porter, 1996; Jordet, 2009a, 2009b; Young & Starkes, 2006). Therefore, athletes who self-regulate well could be more likely to reach the elite status than others (Anshel & Porter, 1996). Studies examining self-regulation in sport training have revealed that experts are better self-regulators than non-experts or novices (Cleary & Zimmerman, 2001; Kitsantas & Zimmerman, 2002). Experts were found to use more effective methods to self-regulate their learning. Hence, self-regulation of learning may cause youth athletes to benefit more from practice and competition. As the time to reach the top in sport is relatively short compared to other domains, such as academia or music, effective learning is particularly important in youth sport.

Self-regulation of learning in soccer

The second place the Dutch national team currently holds in the FIFA World Ranking indicates that soccer is played at a high level in the Netherlands (FIFA, 2010). Youth academy
players are on teams playing at the highest competition level in the Netherlands, which includes the top 1% of same-age Dutch players. Consequently, it is relatively difficult for Dutch youth soccer players to become selected for a youth academy team of a professional soccer club. As mentioned before, youth academies provide high-quality coaching and training facilities (e.g., Stratton et al., 2004), meaning that selected players may get more opportunities to make progression (e.g., Ward et al., 2007; Ford et al., 2009). Making progression seems crucial for young players, because only a small minority of players labeled as talented will become professionals (e.g., Siebelink, 2008). This indicates that self-regulation of learning may be an important factor to consider in this group.

That said, one must keep in mind that soccer performance is multifaceted and that soccer players must perform well on many of these facets to become outstanding players (Reilly, Williams, Nevill, & Franks, 2000). Players must excel in a combination of anthropometrical, physiological, technical, tactical, psychological and many more aspects to attain optimal performance levels (e.g., Elferink-Gemser, Visscher, Lemmink, & Mulder, 2004, 2007; Reilly et al., 2000; Vaeyens, Lenoir, Williams, & Philippaerts, 2008). Furthermore, environmental factors, such as the coach, peers, how the sport is organized, parents, etcetera, have their impact on the learning process. As self-regulation of learning may be associated with some but not all of these aspects and these aspects all interact, the reader should take into account that self-regulated learning as measured in the current thesis, although important, is not proposed to be the main predictor of soccer expertise. It is suggested that self-regulation of learning may assist players to learn more effectively, which may be one of the reasons for differences in performance level among youth soccer players, and which may have its impact on their development.

The discrete performance measures used in current soccer talent identification and selection processes provide limited information about players’ development potential (Morris, 2000). Development potential is the capacity of players to improve their performance. It has been suggested that youth soccer players should be monitored on different performance aspects of soccer, such as technique or endurance capacity (e.g., Huijgen et al., 2009; Roescher et al., 2010). Variables related to development potential, such as indicators of self-regulated learning, may provide valuable information in addition to current performance measures. It is suggested that, instead of investigating what has been learnt already, the main focus of research on the development of youth soccer players should be on their capacity to improve (e.g., Vaeyens et al., 2008). Self-regulation of learning can be an important variable in this respect.

Model of self-regulation of learning

The model to measure self-regulation of learning in the present thesis, was based on Zimmerman’s (2006, 2008) self-regulated learning theory and the expert learner model described by Ertmer and Newby (1996). Important notions in these models are the self-regulation aspects of planning, self-monitoring, evaluation, reflection, effort, and self-efficacy. Self-regulated learners are assumed to be willing to make progression. To reach this goal, they must know which performance aspects need improvement and how this can be accomplished.
It has been suggested that individuals who self-regulate well must: a. **Plan** their path toward a goal in advance of their actions, b. **Self-monitor** their progress relative to their goals, c. **Evaluate** the process and outcome after the execution of their plan, and d. **Reflect** upon the learning process during cycles of planning, self-monitoring, and evaluation. This means that they put their knowledge into action and increase the number of strategies they can use, which gives them more possibilities to approach and perform future tasks (Ertmer & Newby, 1996).

Self-regulated learning research among students revealed that motivational outcome variables (e.g., effort) and motivational beliefs (e.g., self-efficacy) were positively linked with cognitive and metacognitive strategy use (e.g., Pintrich & Schunk, 2002; Schunk, 2001). Other research has suggested that to attain optimal performance levels, youth soccer players must be willing to expend maximal efforts to improve and sustain these efforts over years (Ericsson et al., 1993; Ford et al., 2009; Helsen et al., 1998). Self-efficacy is the belief that one is able to successfully execute a required behavior to attain a certain goal (Bandura, 1997), and is a central motivational variable in Zimmerman’s theory of self-regulated learning. Thus, effort and self-efficacy were the motivational variables included in the self-regulation of learning model. The metacognitive and motivational aspects were assumed to be reflected in learning behaviors, that is, behaviors during practice.

Figure 1 illustrates an example of how a soccer players’ self-regulated learning process could work. The player **reflects** on his performance, wondering how he can improve his effectiveness as a player. He concludes that he should practice one of his strengths: his free kick. As a striker, he often gets into the position to take free kicks, meaning that he may increase the number of goals he scores. He **plans** to practice his free kick for 30 minutes after each training, trying to kick from different angles, using different foot placements, trying to focus on different areas of the goal, etcetera. He then **monitors** how many of 20 free kicks he scores each time, taking into account the aspects he decided to focus on during practice. After some time, he evaluates whether he indeed scores more goals because he practiced his free kicks. During ongoing cycles of planning, self-monitoring, and evaluation, the player can make adjustments in the process. Additionally, the player must put **effort** in practicing free kicks and he must believe that he can indeed score more goals through practicing his free kick (**self-efficacy**).

**Purpose**

The first aim of the current thesis was to investigate the relationship between self-regulation of learning and performance level among youth soccer players aged 11 to 17 years. Self-regulated learning was defined as being metacognitively, motivationally, and behaviorally proactive in one’s own learning process (Zimmerman, 2006). This indicates that players must know what aspects to improve and how to do so, that they must be motivated to improve, and that they must act accordingly. The metacognitive and motivational aspects of self-regulation were thought to be reflected in practice behaviors. The second aim of this thesis was to identify behavioral correlates of the self-regulation aspects of planning, self-monitoring, evaluation, reflection, effort, and self-efficacy.

To this end, the behaviors of elite youth soccer players were observed during practice. The
How can I increase my effectiveness as a player? My kick is one of my strengths. I could increase my effectiveness by practicing free kicks.

**Planning**
- After each training, I practice my kick for 30 min.

**Reflection**
- Do I indeed score more goals because I practiced my free kick?

**Monitoring**
- Each time, I count how many of 20 free kicks I score while focusing on different angles, foot placements, etc.

**Evaluation**
- I put maximum effort in each practice session and believe that I can improve my effectiveness by practicing free kicks.

**Figure 1.** The self-regulation of learning process in phases
adolescent age range was chosen because most of the development of players towards professional soccer takes place during these years and the time to reach the top in soccer is limited.

**Outline of the dissertation**

First, an appropriate measurement instrument for self-regulation of learning was needed. Chapter 2 describes a study investigating the reliability and validity of the Self-Regulation Scale (SRS) among adolescents aged 11 to 17 years. The SRS was set out to measure self-regulation as a relatively stable attribute in multiple learning domains. Chapter 3 assessed the level of academic achievement of elite youth soccer players in comparison with regular students to investigate whether the stereotype of youth soccer players performing poor at school actually holds. Self-assessed self-regulated learning scores were examined, as it was assumed that self-regulation of learning processes may underlie attainment in both sport and academia. Chapter 4 describes the first step to find out whether self-regulation of learning discriminates between performance levels in youth soccer. Self-assessed self-regulated learning of elite and non-elite youth soccer players was compared. In Chapter 5, the relationship between self-regulated learning and performance level of international and national level youth soccer players (all elites) aged 12 to 17 years was examined. As relative age may affect this relationship through its association with maturation, experience, and performance level, relative age was included as a possible confounder. Since we were interested in how the questionnaire scores were reflected in behavior during practice, Chapter 6 was aimed to measure behavioral correlates of self-regulation in elite youth soccer players. Behaviors regarded as indicative of self-regulated learning were identified by interviewing six expert youth soccer coaches. These behaviors were observed during practice of eight elite youth soccer players aged 15-17 years, and linked with self-reported self-regulated learning scores to describe behavioral correlates of self-regulation. In Chapter 7, findings of Chapters 2 through 6 are discussed in a general discussion. This chapter contains the main findings of the present thesis, conclusions, theoretical considerations, implications for future research, and implications for soccer practice.


