

THE PATH TO EXPERTISE IN PORTUGUESE AND USA BASKETBALL PLAYERS

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Abstract:

The purpose of this study was to analyze the path to expertise of Portuguese and USA basketball players according to their specific playing position (i.e. guards, forwards and centers). The information needed to achieve this purpose was collected through a validated questionnaire applied to 75 Portuguese and 45 USA players in the Portuguese League. This questionnaire provided detailed information about the quantity and type of sporting activities performed throughout their careers. The results suggest some variability in the path followed by the players according to a playing position, except for the conformity displayed regarding early sport diversification (especially between six and ten years of age). The main findings emerging from this comparison suggest that while the Portuguese basketball players specialize in basketball earlier, the USA players seem to be guided to maintain a more comprehensive and diversified approach until 18 years of age.

Key words: skill acquisition, developmental stages, talent, nationality, playing position

Introduction

The limits of human performance are continually challenged in sport, where athletes strive to achieve the highest competitive level throughout a non-linear process of acquisition and manifestation of *expertise*. Yet, this level is achievable by only a few exceptionally talented athletes, who seem to take advantage of innate and/or acquired skills developed in various forms of practice, such as free play, free practice, deliberate play and deliberate practice (Côté, Baker, & Abernethy, 2007).

Currently, several researchers are collecting detailed information about the trainable factors that contribute most to achieving an exceptional performance level. Along with recognizing importance of primary factors (Baker & Horton, 2004), like genetic or psychological ones, strong evidence has emerged in the last few years from the retrospective analysis of training factors. Consistent findings with both experts and non-experts on learned capacities and abilities have provided support for the relationship establishment between training and expertise. However, despite the existence of a positive and robust relationship between practice and performance (Ericsson, Krampe, & Tesch-Römer, 1993), consensus about the adequate type of early involvement (Baker, Horton, Robertson-Wilson, & Wall, 2003) or training stimulus is still

far from being achieved. For instance, specialists in the skill acquisition field have argued either in favor or against early specialization and early diversification. On the one hand, some researchers advocate the assumption that aspiring expert athletes must limit their childhood sport participation to a single sport, with a deliberate focus on training and development in that sport (i.e. early specialization). On the other hand (i.e. early diversification), there are those who believe in the benefits of multiple sport involvement before specializing at later stages of development (Côté, Lidor & Hackford, 2009).

Despite the weight of evidence presented by each side in this dispute, it seems clear that sports are not all equal in terms of their maturational, physiological, psychological, technical or tactical requirements related to success. While the late-specialization sports, including team sports, track-and-field, combat sports, cycling, and racquet sports, require a generalized approach to early training, the early-specialization sports, such as diving, gymnastics and swimming require early sport-specific specialization in training (Stafford, 2005). From this proposal of sport categorization emerges the idea that the process of long-term athletic development must respect the existence of key periods where all forms of practice or training must be adjusted to the optimal trainability periods of motor

skills (Ford, et al., 2011). Particularly in team sports, participation in various sporting activities may be essential to developing intrinsic motivation and selectively transferring skills, including physical (Baker, 2003) and creative behavior (Memmert, Baker, & Bertsch, 2010) to the sport of prime interest. Moreover, this approach during the early stages of sport involvement may help young people to refine their physical literacy, which is essential in the acquisition and development of more specific and complex skills (Stafford, 2005). Evidence from recent studies with expert players from team sports did not fully support this approach based on an early sport diversification. For instance, Leite, Baker, and Sampaio (2009) found two different approaches to early sport involvement while the majority of soccer and roller-hockey players started practicing their sport of prime interest between 6 and 10 years of age, volleyball and basketball players revealed more variability in the age at which they began practicing their main sport. The effect of cultural importance could possibly explain some of these results, especially in soccer, by the popularity of a certain sport and by the pressure from media, parents, coaches and sport managers.

Taking these facts into consideration, it is important to note that the path to expertise in team sports is a very complex process demanding that players meet the performance requirements of their specific playing position on the court. Therefore, is it possible that early sport involvement among basketball players influences their functional specialization (i.e. if they will play guard, forward or center)? Several studies have contributed to the identification and differentiation of players on the basis of their specific playing position and/or role on the court (i.e. guards, forwards and centers) (Sampaio, Janeira, Ibáñez, & Lorenzo, 2006). Particularly in basketball, the differences according to the specific playing position are clear as regards the players' anthropometric, physiological and psychological characteristics, as well as game performance (Ziv & Lidor, 2009). Performance analysis research clearly distinguishes players according to certain abilities, specific tasks, knowledge or technical and tactical skills (Dežman, Trninić, & Dizdar, 2001). In fact, previous research established a system of criteria to select and recruit basketball players for specific playing positions using game-related statistics profiles, in an attempt to help coaches' with their decision-making (Trninić, Dizdar, & Dežman, 2000). Harbili, Harbili, and Yalçin (2011) analyzed the importance of players' recruitment in Turkish basketball league. Their results showed that international players had higher efficacy ratings than Turkish players; however, no significant effects in efficacy ratings were found when playing position and nationality factors were considered. These studies seem to evidence the importance of parti-

cular playing positions (i.e. guard, forward and center) and nationality (players that play in their own country and players from other countries integrated in teams). However, no study has clarified if these variables differentiate players already in terms of their sporting career. Is it possible that the age at which a person starts doing any sport (*sport starting age*), or the age at which players specialize in basketball (*main sport starting age*), or even the type of sports (individual, collective or combat) experimented in the early involvement, may influence a functional specialization? Moreover, it is important to understand if the path followed by the players eventually restrains their development and if it does or does not enable the maximization of their potential.

In Portugal, the success of the basketball high-performance teams greatly depends on the recruitment of foreign players whose influence on the final score is confirmed by their performance efficiency. Thus, we think that a better understanding of the skills and abilities of the best foreigners playing in Portuguese professional leagues could be crucial to improving national sport policy, especially in the case of talent development and identification programs. Therefore, the objective of this study was to describe sport careers of Portuguese players according to their specific playing positions and compare these careers with those of the USA players playing in Portuguese high-performance teams.

Methods

Participants

The sample was composed of 75 Portuguese senior male basketball players, divided according to their specific playing position on the court (guards $n=23$, forwards $n=30$, centers $n=22$) and 45 USA players (guards $n=7$, forwards $n=18$ and centers $n=20$), all playing in the Portuguese league. The data collection was conducted in three consecutive seasons, between 2006/2007 and 2009/2010. Players with less than six years of basketball practice experience and/or under 24 years of age were not included in the sample.

Procedures

Each participant completed a questionnaire developed specifically to provide a detailed longitudinal profile about the involvement in specific and non-specific sporting activities practiced by team sports players (Baker, Côté, & Abernethy, 2003a). Extensively reviewed by its authors in previous studies, this procedure allows the acquisition of quantitative and qualitative information about the sporting activities in which the subjects participated throughout their careers. The participants were given 30 minutes to one hour to complete the questionnaire in a quiet environment. The authors

disclosed the main instructions before the players began the completion and a verbal consent to participate in the study was obtained from the players. The original version of the questionnaire was adequately translated into the English language to facilitate its completion by the USA players. This version was inspected by two native English teachers. Finally, complying with the suggestions of the teachers, the authors drafted the final version.

The initial part of the questionnaire comprised several sample descriptive variables such as the age at which the players started to practice sports (*sport starting age*) and the specific training of basketball (*main sport starting age*), as well as the period of interruption between sporting seasons (*average season length*). The second part of the questionnaire addresses information on the quantity and the type of sporting activities, the time spent in training, as well as the participation in official competitions at each developmental stage, suggested by Stafford (2005) in his proposal for late-specialization sports such as basketball, specifically: Fundamentals (FUN; between 6 and 10 years of age), Learning & Training to Train (TRAIN; 11 to 14 years old), Training to Compete (COMPETE; 15 to 18 years old) and Training to Win (WIN; 19 years old and beyond). Therefore, this section of the questionnaire was made up of 16 items, four for each of the previously identified stages of development.

Based on previous works (Almond, 1986), the sporting activities were allocated into four main categories: *basketball*, *other team sports*, *individual sports* and *combat sports*. These four categories of sporting activities are mutually exclusive. When subjects referred to more than one of the four categories, they were allocated to the fifth category labeled *combination of several sports*. At the same time, the players were questioned about the average time per week spent in these activities on each developmental stage previously mentioned.

The players reported the duration of participation using the ordinal scale suggested by the authors of the questionnaire (Baker, et al., 2003a).

Statistical analysis

In order to test the hypothesis under study, Kruskal-Wallis test was used to compare the players' responses considering their playing position on the court (guards vs. forwards; guards vs. centers; and forwards vs. centers). Mann-Whitney U test was used to compare the Portuguese and the USA players, separately for each playing position. Bonferroni adjustments were applied to correct for multiple tests. The corresponding Cliff's Delta effect sizes were also calculated (Macbeth, Razumiejczyk, & Ledesma, 2011). All data was analyzed with SPSS for Windows, version 16.0 (SPSS Inc., Chicago, IL) and statistical significance was maintained at 5%.

Results

Due to the nature of the data collected (based on recalling information) and given the complexity and depth of the gathered information, the guidelines from the authors of the questionnaire were followed. The consistency and temporal stability of retrospective information was verified by re-testing 17 Portuguese (38%) and 9 USA (20%) players, approximately one month after completing the questionnaire for the first time. The points of percent agreement between the numbers of activities reported by the players on both evaluations were included in a data base (Bahrack, Hall, & Berger, 1996). There was a high level of agreement (87%) between the information given by the players at both time points. To confirm the validity of information gathered, a sample of the Portuguese players' parents (N=9), was asked to describe the number and type of early activities and the number of minutes of practice as provided by the players (Baker, et al., 2003a). There was also a high level of agreement (91%) between the total number of activities reported by the players and the total reported by their parents. The intraclass correlation coefficient for the number of practice minutes per week estimated by the players and the comparable estimate provided by their parent was $r=.81$. These results indicate that data validity and reliability was adequate.

Table 1 describes the Portuguese and the USA players' *sport starting ages*, *main sports starting ages* and *the average season length*. While most of the Portuguese guards and forwards started practicing sports between six and ten years of age, centers revealed a close distribution between six and ten years (40.9%) and between eleven and fourteen years of age (45.5%). The significant differences were found particularly between guards and centers ($\chi^2=16.61$, $p<.05$, $ES=-0.55$). Further evidence supported this so-called later commitment to basketball training linked with the centers, especially in the *basketball starting age* ($\chi^2=37.3$, $p<.05$, $ES=-0.85$).

The results of the sports activities experienced across the developmental stages are presented in Table 2. The main findings focus on the differences between the centers and the other playing positions, especially in the time dedicated to training in the initial developmental stages. Inferential analyses revealed the significant differences in sports activities experienced between 6 and 10 years of age and between 11 and 14 years of age, in which centers were outscored by guards and forwards. Higher effect sizes were detected in the initial stage ($\chi^2=819$, $p<.05$, $ES_{guards\ vs.\ centers}=.41$, $ES_{forwards\ vs.\ centers}=0.39$). No differences were found in the activities performed after 18 years of age ($p>.05$).

The summary of the results obtained in the comparison between Portuguese and USA players considering the playing position are presented in

Table 1. Descriptive and inferential statistics for the long-term development variables

Variables	Portuguese						USA					
	Guards	Forwards	Centers	χ^2	p	Cliff's δ	Guards	Forwards	Centers	χ^2	p	Cliff's δ
Sport starting age						a) -0.22						
6-10 years of age	95.7	73.3	40.9			b) -0.55	85.7	90.9	70.0			
11-14 years of age	4.3	23.3	45.5	16.61*	.000	c) -0.34	14.3	9.1	30.0	5.38	.055	
15-18 years of age	-	3.3	13.6				-	-	-			
≥19 years of age	-	-	-				-	-	-			
Main sport starting age						a) -0.62						
6-10 years of age	91.3	30.0	9.1			b) -0.85	14.3	45.5	50.0			
11-14 years of age	8.7	63.3	63.6	33.70*	.000	c) -0.34	85.7	27.3	30.0	0.12	.943	
15-18 years of age	-	6.7	27.3				-	27.3	20.0			
≥19 years of age	-	-	-				-	-	-			
Average season length												
12 months	4.3	-	-				-	27.3	-			
11 months	39.1	53.3	59.1	1.44	.486		85.7	9.1	30.0	5.36	.068	
10 months	34.8	40.0	31.8				14.3	45.5	20.0			
9 months	13.0	3.3	9.1				-	18.2	40.0			
≤ 8 months	8.7	3.3	-				-	-	10.0			

Values presented in the table are % based.

* Significant differences at $p < .05$; between a) guards and forwards; b) guards and centers; and c) forwards and centers.

Table 2. Descriptive and inferential statistics for the activities performed across the developmental stages

Activities performed between 6-10 years of age	Portuguese						USA					
	Guards	Forwards	Centers	χ^2	p	Cliff's δ	Guards	Forwards	Centers	χ^2	p	Cliff's δ
Average training minutes per/week												
None	4.3	10.0	31.8				14.3	9.1	30.0			
60 minutes	-	3.3	-				-	-	-			
60-120 minutes	-	-	9.1	8.19*	.017	b) 0.41	-	-	10.0	5.16	.076	
120-180 minutes	21.7	6.7	9.1			c) 0.39	-	9.1	-			
180-240 minutes	17.4	20.0	18.2				14.3	-	-			
240-300 minutes	8.7	13.3	13.6				14.3	-	-			
>300 minutes	47.8	46.7	18.2				57.1	81.8	60.0			
Activities performed between 11-14 years of age												
Type of sporting activities experienced												
None	-	-	13.6				-	-	-			
Basketball	87.0	56.7	59.1	6.27*	.044	a) -0.29	42.9	27.3	30.0	.057	.972	
Team sports	-	6.7	9.1				-	18.2	20.0			
Individual sports	-	-	4.5				-	-	-			
Combinations of several sports	13.0	36.7	13.6				57.1	54.5	50.0			
Average training minutes per/week												
None	-	-	13.6				-	-	-			
120-180 minutes	-	3.3	-				-	-	10.0	.894	.640	
180-240 minutes	4.3	6.7	4.5	7.43*	.024	c) 0.22	-	-	-			
240-300 minutes	21.7	6.7	27.3				14.3	18.2	10.0			
>300 minutes	73.9	83.3	54.5				85.7	81.8	80.0			

Values presented in the table are % based.

* Significant differences at $p < .05$ between a) guards and forwards; b) guards and centers; and c) forwards and centers.

Table 3. Differences in the sport career are more evident in the activities performed between 11 and 14 years of age, especially in the number and type of sports. While Portuguese players practiced fewer sports after 11 years of age and focused on basketball training, USA players kept their involvement in a wide range of combined sports until 15 to 18 years of age. These differences of paths resulted in significant differences between all positions in the *number of sporting activities experienced* between 11 and 14 years of age: guards ($z=-2.46$, $p<.05$, $ES=-0.46$), forwards ($z=-2.38$, $p<.05$, $ES=-0.38$) and centers ($z=-2.55$, $p<.05$, $ES=-0.53$). This pattern of involvement in a range of sports (i.e. *type of sporting activities*) remains for forward USA players ($z=-4.74$, $p<.01$, $ES=-0.44$) and center ($z=-2.09$, $p<.05$, $ES=-0.32$) between 15 and 18 years.

training earlier than the forwards and, especially, earlier than the centers. In fact, the guards and the forwards dedicated more time to practice than the centers in the early sport involvement, especially until 14 years of age. The results suggest that the players who handle the ball in elite basketball may play that specific role because they accumulated large volumes of training and probably for this reason they developed the skills needed to succeed. As mentioned by Sampaio et al. (2006), guards play a more demanding role from a cognitive standpoint, since they are often responsible for coordinating the offensive set plays and tempo and, in certain cases, they also take decisions about the type of defense used play-by-play. Along with these lines, Sindik (2011) studied the personality traits by player's positions in the Croatian top basketball

Table 3. Inferential statistics for the comparison between Portuguese and USA players

Variables	Guards _{POR} vs. Guards _{USA}			Forwards _{POR} vs. Forwards _{USA}			Centers _{POR} vs. Centers _{USA}		
	z	p	Cliff's δ	z	p	Cliff's δ	z	p	Cliff's δ
Average season length	-1.78	.074		-0.32	.751		-2.14	.032	-0.25
Activities performed between 6-10 years of age									
Type of sporting activities experienced	-2.04	.041	0.47	-0.03	.975		-0.17	.866	
Competition participation	-3.02	.003	0.56	-1.56	.118		-0.36	.722	
Activities performed between 11-14 years of age									
Number of sporting activities experienced	-2.46	.014	-0.46	-2.38	.017	-0.38	-2.55	.011	-0.53
Type of sporting activities experienced	-2.38	.018	-0.44	-1.42	.156		-2.42	.016	-0.53
Activities performed between 15-18 years of age									
Number of sporting activities experienced	-1.81	.070		-4.72	.000	-0.44	-2.05	.040	-0.32
Type of sporting activities experienced	-1.81	.070		-4.74	.000	-0.44	-2.09	.037	-0.32

MW: Mann-Whitney test; and significant differences at $p<.05$. POR=Portuguese players and USA=USA players.

Discussion and conclusions

The objective of this study was two-fold: (i) first, we aimed at describing the sport career of Portuguese players according to their specific positions, and (ii) second, at comparing these sport careers with the ones followed by the USA players playing in Portuguese high-performance teams.

Our results confirmed previous studies regarding the age of active involvement in sport as most of the players under examination (whether they were Portuguese or the USA players) engaged in sport between their 6 and 10 years of age. These results are in accordance with previous research made with Portuguese team sports players (Leite, et al., 2009). The guards seem to focus on basketball

league and showed that guards had more diverse personalities requiring individualized approach, in particular due to a more creative role in a team compared to forwards and centers. This finding is possibly related to a high volume of play and practice accumulated during early career stages, which may allow guards to improve their decision-making and creative task-solving performance.

The choice of playing in a given position can also be related to anthropometric advantages or body weight (Dežman, et al., 2001). However, there are several reported cases where guards exceeded centers in height and/or arm span, and the taller players had better ball handling skills than guards or forwards. This argument is consistent with the

results reported by Trninić, Papić, Trninić, and Vukičević (2008), who found that the analysis of players' quality must consider what and how many tasks they can perform and not only their playing position demands.

Another finding that stands out in the comparison between playing positions is the difference in type of sport practiced across the initial career stages. The guards reported greater involvement in team sports other than basketball, while the centers reported more diversified sport experiences, including participation in individual sports. These results are similar to those of Memmert et al. (2010), who state that more creative players accumulated more time in both the diversified sporting practices and main sport during their careers than the less creative players. In fact, guards play more creative roles in a team (Sindik, 2011). This finding may be explained by the fact that guards spent more practice in different sports across the initial stages than those playing in other positions. However, the present results do not clarify whether this type of experience (in sports that share functional structure, such as invading the territory of the opponents), influenced the players' sport career or even the option for playing a particular position. Recent studies are shedding light on this hypothetical transfer of skills between sports, mainly in terms of cognitive aspects (Abernethy, Baker, & Côté, 2005; Memmert, et al., 2010), but numerous questions remain unanswered. For example, there is a need to study the transfer of pattern recall skills with large samples of both expert and novice players, and the studies must include more precisely matched control groups.

The limited vacancies for foreign nationality players force coaches and managers to select players with high-level technical and/or tactical skills or morphological traits above the team's average. On the other hand, Trninić et al. (2008) suggested four procedures that coaches should use to recruit players and identify experts for each specific position: detection (during young age), recognition (identification of players during formative stages), and orientation and selection procedures related to assessing players' potential and their actual quality in a particular formative stage. They also pointed out that during the first stages the coaches should aim to identify relevant abilities, tasks and characteristics because they are important preconditions for the recognition and orientation of players into team sports, as well as for training plans that focus on player's proficiency enhancement for specific tasks and roles during the game.

One particular study (Harbili, et al., 2011) analyzed the importance of players' recruitment in the Turkish basketball league and showed that the international players had higher efficacy ratings than the Turkish players. Thus, the process that leads to

the final selection acquires special importance where every detail could be critical, including aspects that are not often as valued as career statistics or milestones, such as the sport career patterns of the players. Additionally, patterns of early involvement may provide valuable information that may help to establish a more comprehensive view of the path to expertise among basketball players and also help to reinforce the importance of a longitudinal follow-up of the youngsters.

The *sport starting age*, *basketball starting age* and *average season length* did not differentiate the Portuguese from the USA players. Unsurprisingly, no significant differences were found in the activities performed during senior age (i.e., 18 years of age), especially considering the requirements at this level of competition are selective and require a high volume of training to prepare for games and tournaments. Still, we are aware that the ordinal scale used in our study (from 60 to 300 minutes per week) may not be sensitive enough to identify differences between players. However, the number and types of sports practiced at all stages prior to the senior age – between 6 and 18 years of age, were significantly different between the Portuguese and USA players. Indeed, the USA players reported a higher number of sports practiced, essentially combinations of different types of sports. Among these results, the differences for forwards and centers between 15 and 18 years of age (even with a medium effect size) were considerable. This may suggest that the Portuguese policies favor premature specialization, while the USA players are encouraged to maintain participation in multiple sports until older ages. In particular, Powers, Conway, McKenzie, Sallis, and Marshall (2002) studied 24 middle schools in San Diego (California, United States), and their results showed that all schools offered multiple extracurricular sport activities, but the most popular activities among students were traditional competitive sports, and they attracted more students with advanced motor skills (i.e. basketball, track-and-field, soccer, tennis, and football). Therefore, the pattern among the USA players involves participation in a wide variety of sports during early stages, which allows them to continue with a sport that best fits their physical and motor characteristics.

According to the results of this study, the Portuguese players experience a progressive specificity of basketball training at an early age and this may limit their early development and lead them to focus on developing specific characteristics for a particular playing position. One of the most interesting findings of this study is the confirmation that playing multiple sports until older ages does not limit mobility to higher competitive levels. On the contrary, it apparently contributed to the broad training repertoire required to succeed at that level.

It is also important to remember that cultural factors contribute to and influence sport policies and that in Portugal the structure and demands of the youth competitions may account for the increased specialization at young ages.

To sum up, the results suggest that the initial approach could be directed towards a more comprehensive development of physical literacy. The Portuguese players tend to experience a progressive specificity of basketball training at an early age, which may limit the youngsters' development and lead them to a monotonic development of specific characteristics of a given playing position. A consequence of this *more selective orientation to basketball* may be an inadequate (in type and quantity) stimulation of motor skills required to succeed. Additionally, Trninić et al. (2000) pointed out that "*the expert experience suggests that successful specialized players satisfy the most important criteria for a position, while universal, versatile players satisfy greater number of criteria for more positions.*"

Several authors suggest that this approach may produce better acquisition and consolidation of fundamental techniques and cognitive skills (Stafford, 2005; Elferink-Gemser, Visscher, Lemmink, & Mulder, 2007; Leite & Sampaio, 2010). Memmert et al. (2010) reinforce this long-term strategy since it produces creative thinking in players and bypasses the mechanical and stereotypical emphasis that is sometimes provided in the current training structure.

Limitations of this study include the fact that we compare samples of different sizes. However, this irregular distribution expresses the panorama observed in the studied sport context, taking into account that there were fewer USA than the Portuguese players in the Portuguese League. Additionally, in future research it would be useful to obtain detailed information regarding childhood participation in activities that are not classified as sports. These activities may also contribute to developing motor literacy among players and improve long-term sporting performance.

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PUT USAVRŠAVANJA PORTUGALSKIH I AMERIČKIH KOŠARKAŠA

Cilj je ovoga rada bio analizirati kako su se usavršavali portugalski i američki košarkaši do svojih specifičnih igračkih pozicija (bekovi, krila i centri). Podaci za provedbu ove analize prikupljeni su pomoću provjerenog upitnika koji je ispunilo 75 portugalskih i 45 američkih košarkaša koji igraju u portugalskoj košarkaškoj ligi. Upitnik je omogućio prikupljanje detaljnih podataka o kvantiteti i vrsti sportskih aktivnosti koje su igrači provodili prije i na početku svojih igračkih karijera. Rezultati su pokazali varijabilnost razvojnih putova igrača s različitim igračkih pozicija, ali i visoko slaganje što

se tiče raznolikosti aktivnosti u kojima su ispitanici sudjelovali u ranoj životnoj dobi (osobito u dobi od 6 do 10 godina). Glavne spoznaje koje su dobivene ovom usporedbom košarkaša sugeriraju da se portugalski košarkaši ranije specijaliziraju za izabrani sport, dok američke košarkaše njihovi učitelji/treneri usmjeravaju na što svestranije i raznolikije sportsko usavršavanje do 18. godine.

Ključne riječi: usvajanje vještina, stupnjevi razvoja, talent, nacionalnost, igračka pozicija