

## Racket sports teaching implementations in physical education – a status quo analysis of German primary schools

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Published online: June 30, 2018

(Accepted for publication May 29, 2018)

DOI:10.7752/jpes.2018.02128

### Abstract:

*Problem statement:* Physical education (PE) and its content as a school subject are often and controversially discussed in public and political debates. Changes of PE in different school forms were reported from authors in different countries. In the turn of the millennium, comprehensive educational reforms changed the task of PE, e.g. in the German federal school systems' context. However, research examining the actual implementation of specific sports in PE is rare; in particular with a focus on primary schools.

*Purpose:* Therefore, the aim of this study was to analyze the actual implementation of racket sports (RS) at primary schools' PE, further addressing parameters that impact practical applied racket sport teaching.

*Participants and methods:* 498 teachers volunteered to participate in this study (age: 44.58 ± 10.56 years, work experience: 16.998 ± 10.86 years). All participants were teaching PE at German primary schools. A standardized questionnaire, including closed and open questions in four thematic fields, was designed and sent using EvaSys®. *Results:* Results showed that 69.88% of the teachers teach racket sports in their primary school PE classes. The questionnaire's item "Teaching racket sport in PE" was significantly related to "RS in school's internal sport curriculum" (P=0.000), "work experience" (p= 0.001), "PE specialist" (p=0.000) as well as "practicing racket sports during leisure time" (p= 0.000).

*Conclusion:* In line with the respective syllabus and school internal sports curricula, the work experience, university degree, and leisure time activities have an impact on a teachers' implementation of racket sports in PE. Based on the present findings, changes in study regulations may be suggested to benefit the implementation of racket sports in primary school PE.

**Key Words:** PE teacher; Badminton; Tennis; Table Tennis

### Introduction

Physical education (PE) and its content as a school subject is often and controversially discussed in public and scientific debates. Changes of PE programs were reported from authors in different countries, e.g. in the school system of the United Kingdom (Jones & Green, 2015; Kirk, 2005) and in the German school system (Ruin, 2015). In contrast to other school subjects nowadays PE has a special role in the German school system: not only the pure transfer of knowledge, general and specific skills but additionally a pedagogical socializing mandate (named PE's double mandate; MSW NRW, 2008). In the turn of the millennium, comprehensive educational reforms changed the task of PE in the German federal school systems' context, particularly and exemplarily in North Rhine-Westphalia (NRW, federal state with the largest population in Germany). Although there are different curricula in each federal state, Prohl & Krick (2006, p. 21) suggest the NRW's curriculum to serve as a 'prototype' of a new curricula generation. According to these curricula one decade later competence-based curricula were introduced in NRW (MSW NRW, 2008; 2011). In addition to the double mandate of PE obligatoric, standardized expectations on competences are focused. As Aschebrock (2013) points out, concepts for concrete teaching design are basically not defined. Ruin (2015) structures the curricula development within the last two decades in NRW in three periods. At first the pragmatic phase of qualification ["pragmatisch-qualifikatorische Phase"] (between 1980 and 1998); secondly the phase of educating PE ["erziehender Sportunterricht"] (between 1999 and 2007) and thirdly the phase of orientation on expertise ["Phase der Kompetenzorientierung"] (since around 2008). The first and second phase were defined by Ruin referring to previously suggested systematics (Stibbe & Aschebrock, 2007), whereas the third phase accords to educational-policy regulations introducing an expertise driven curricula. Gerlach, Kussin, Brandl-Bredenbeck & Brettschneider, (2006) asked pupils of different grades and school types about the frequency of specific sports occurring in PE. Relative frequencies of sporting activities taught in PE were reported ranking small sport games (69.0%), team sports such as basketball (66.3%) and volleyball (65.4%), gymnastics (61.3%), football (59.8%) and track and field (57.8%) – all around 60%; gym and fitness exercises (36.4%), hockey (31.2%) and

badminton (30.03%) – all just over 30%; swimming (24.7%), climbing (19.9%), dance (18.2%), relaxation exercises (16.2%), table tennis (13.3%), and finally other sport activities all under 10% such as e.g. tennis (3.5%). Gerlach et al. (2006) report that in fourth grade the range appears to be wide with 14 sport activities and games reach more than 20%. More detailed results for primary schools fourth grade are not reported. Although the curriculum for primary PE in NRW schools (MSW NRW, 2008) requires e.g. competences in the field of racket sports at the end of the fourth school year, there are no specific studies of its practical implementation. Changes of PE programs in schools were also reported from other authors e.g. the UK school system (Jones & Green 2015; Kirk 2005). With their research on school sports that more generally addressed didactics in relation to PE (e.g. double mandate in Germany, pedagogical aspects, competences, PE teachers qualifications), research on sports-specific implementations in PE widely remain to be elucidated, particularly with respect to racket sports taught in primary school's PE.

#### *Racket sports*

The curriculum to teach PE in primary schools (MSW NRW, 2008) requires competences in the field of racket sports at the end of fourth grade. Specifically named are badminton, tennis and table tennis, also in simplified and rule-reduced forms.

Lees (2003) characterized racket sports as badminton, squash, table tennis and tennis. Each game has developed specific game terms to describe the various components and aspects of play. Racket sports, e.g. badminton, requires quick changes of direction, jumps, lunges at the net and rapid arm movements from a variety of postward positions (Shariff, George & Ramlan, 2009). Racket sports are described as intermittent and physiologically demanding, determined largely by the surface, equipment and missile characteristics (Lees, 2003). Racket sports require a unique combination of aerobic and anaerobic fitness, of speed, power, agility, flexibility and strength, of perception and action, of technical skill, and of awareness and control (Lees, 2003). Injury risks are considered low compared with many other sports (Lees, 2003). In badminton, the frequency of injury has been found to be less than 5% of sports injuries presenting a hospital casualty clinics (Krøner et al., 1990). Oja et al. (2016) suggest that participating in racket sports indicates substantial reductions in all-cause and cardiovascular disease mortality. As Gerlach et al. (2006) published in reference to the frequency of sports at schools PE, badminton was with 30.3% more often named than table tennis (13.3%) and tennis (3.5%). To the best of our knowledge more studies investigating the occurrence or implementation of racket sports are not available.

Referring to the reports above, racket sports is considered a basic part of the PE curricula, supporting the development of motor skills and conditional aspects for children in primary schools. Additionally, in particular badminton seems to be relatively safe (with very low incidence of injuries) in comparison to other sports. Based on these findings our investigation focused on racket sports implementation in primary PE.

#### *PE teacher in primary schools*

Tsangardiou (2012) suggests that, worldwide, PE in early years is mainly taught by primary teachers. Jones and Green (2015) described it as the traditional model in which a so-called generalist classroom teacher is responsible for teaching all school subjects listed in the curriculum. They report that in the British school system primary PE lessons tend to be taught by one, or a combination of, three different groups: generalist classroom teachers, specialist primary PE teachers and so called sports coaches. PE programs, when designed and taught by generalist classroom teachers, have been rated as poor quality (Graber, Locke, Lambdin, & Solmon, 2008; Kirk, 2005). This is discussed to be caused by insufficiently preparing educational programs to teach PE, limited knowledge of necessary pedagogics or PE didactics, and few of them have participated in additional training programs following the initial trainings (Graber et al., 2008; Kirk, 2005; McKenzie & Kahan, 2008; Tsangardiou, 2012). Similar to the British school system, there are two teacher groups in German primary schools: generalist classroom teachers and PE specialists, which have a university degree in sports (Staub, Nobis & Bieder, 2017; Brettschneider, 2007). In Germany, PE teaching in primary schools has been reported for swimming by Brettschneider (2007) with 49% and by Staub et al. (2017) with 44% by generalist teachers.

Comparative studies investigated teaching differences between generalist teachers and PE specialists, suggesting that PE specialists exhibited higher levels of effective teaching behaviors as well as a higher level of activity in PE classes compared to generalist teachers (Faucette & Patterson, 1990; Faucette, Nugent, Sallis & McKenzie, 2002; Rink & Hall, 2008). Findings by Behets (1996) and Block and Beckett (1990) also indicate that PE specialists had more knowledge about specific motor skills and provided more feedback during their lessons.

From another view, McKenzie, LaMaster, Sallis & Marshall (2000) investigated leisure time physical activities of fourth and fifth-grade classroom teachers. They reported an influence of more physically active teachers on PE teaching as well as on PE promotion. Kirk (2005) points out the importance of the high quality early learning experiences to ensure not only a development of physical competences but more relevant the perceptions of competence which underlie motivation of continuing participation in sports.

Therefore, this study aimed to investigate influencing parameters on the decision to teach specific sports, particularly racket sports, in primary school PE. It is hypothesized that (1) racket sports are taught in PE lessons. Further, (2) specific parameters (i.e. work experience, gender, teachers qualification) are hypothesized to influence the decision on teaching racket sports in PE lessons.

## Material & methods

By adopting a quantitative approach, this study was conducted within the context of a larger study examining the status quo of teaching racket sports, especially Badminton in context of primary schools in Germany.

### Participants

A total of 551 teachers volunteered to participate and respond to this study's questionnaire. All participants were teaching PE at primary schools in NRW, Germany. After data cleansing, 498 complete teacher responses remained for analyses (male = 97, female = 401; age:  $44.58 \pm 10.56$  years; work experience:  $17.00 \pm 10.86$  years).

Data collection in this study was approved by the German Sport University's Ethics Committee and was conducted in accordance with the Declaration of Helsinki.

### Procedure

Following a pretest that revealed neither conflicts of understanding nor technical errors, 2917 primary schools in NRW, Germany were contacted via online acquisition and provided consent. Subsequently a tan-locked survey was sent to all respective primary schools forwarding to all staff currently teaching PE. A window to participate in the survey was set for two months.

### Questionnaire

A standardized questionnaire was designed and sent using EvaSys®. According to the primary schools addressed, information and questions were provided in German. The questionnaire was subdivided in five sections: general information about participation, school, participant (focus on 'teacher'), framework (location and materials); PE (e.g. guidelines and personal preferences to implement racket sports). Different types of questions were included (single-, multiple choice, open questions) and answering was optional allowing to skip single questions. Filters for specific questions were set.

Captured data and results were thematically categorized in the chapters: "Description of participating PE teachers"; "Status quo of racket sports in PE" and "Impact of parameters for teaching racket sports in PE". Investigated parameters were defined as items (table 1).

Table 1. Displayed are defined items, their content as well as the original text in German and, where applicable, their categorization.

Item	Content	Original German text	Categorization
	Subjects were asked:		
„Age“	How old are you? (age in years)	„Wie alt sind Sie? (Jahre)“	
„Gender“	Which gender are you? (male/female)	„Ihr Geschlecht (weiblich/männlich)“	
„Work Experience“	How long are you already working as teacher? (in years)	„Wie lange arbeiten Sie bereits als Lehrer/in? (Berufserfahrung in Jahren)“	Clustered in four sections: Group I: until 5 years Group II: 6 until 10 years Group III: 11 until 20 years Group IV: over 20 years
„Practicing racket sport in leisure time“	Are you practicing racket sports in your leisure time?	„Betreiben Sie in Ihrer Freizeit eine Rückschlagsportart?“	
„PE specialist“	Have you studied sports? (University degree)	„Haben Sie ein Sportstudium absolviert?“	
„Schools internal PE curriculum“	Does your school own an internal PE curriculum?	„Besitzt Ihre Schule ein schulinternes Curriculum für das Fach Sport?“	
„RS in schools internal PE curriculum“	Are racket sports fixed down in written schools internal curriculum	„Sind Rückschlagspiele (auch in vereinfachter Form) in Ihrem schulinternen Curriculum für das Fach Sport verankert?“	
„Teaching racket sports in PE“	Are you teaching racket sports in your own PE lessons?	„Behandeln Sie persönlich Rückschlagspiele (auch in vereinfachter Form) mit Ihren Schülern?“	

### Statistical Analysis

Statistical analyses were computed using IBM SPSS 24® and Microsoft® Excel® 2011. Following a first manual data inspection a total number of 498 complete data sets remained for analysis. Descriptive data

calculated for the samples included frequency distribution and relative frequencies [%]. A Pearson chi-square test of independence was used to show interrelations between parameters. The level of significance was set at  $P < 0.05$ . Contingency Coefficient was measured to show the strength of the relationship.

## Results

### *Description of participating PE teachers*

39.96% (199) of the responding participants practice a racket sport in their leisure time. 57.03% (284) of PE teachers have studied sports at University and are therefore PE specialist.

### *Status quo of racket sports in PE*

According to the teacher's responses 72.89% (363) of schools have schools internal curricula. Within this curricula in 67.97% (244 as of relevant 359) racket sports are noted down. 69.88% (348) of the teachers teach racket sports in their primary school PE classes, divided into different types (figure 1).

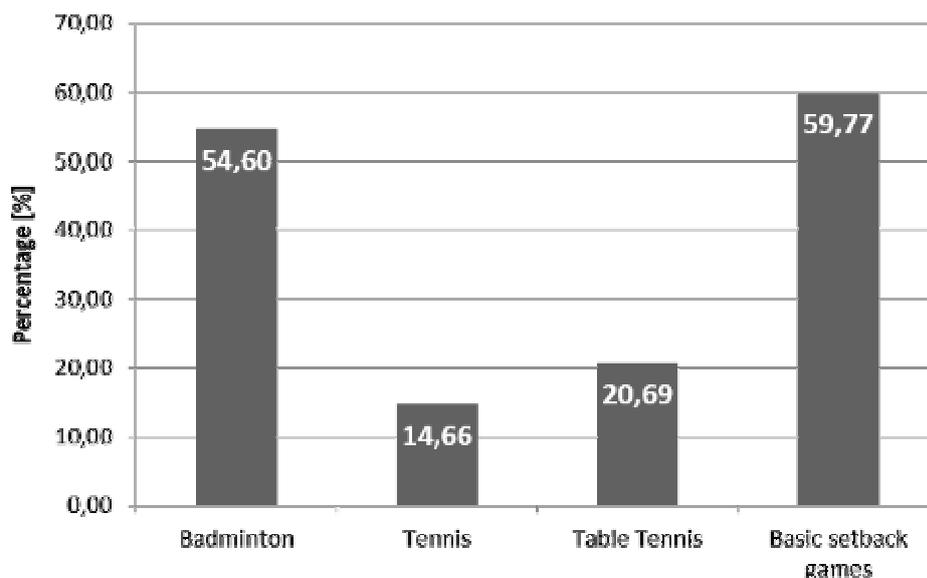


Fig. 1. Displayed are percentages of concrete racket sports taught in primary schools.

### *Impact of parameters for teaching racket sports in PE*

The item "gender" revealed no significant relation to "teaching racket sport (RS) in PE" ( $p=0.428$ ,  $C=0.036$ ), whereas items "practicing RS during leisure time" ( $p<0.001$ ,  $C=0.218$ ), "PE specialist" ( $p<0.001$ ,  $C=0.284$ ), "work experience" ( $p<0.01$ ,  $C=0.177$ ), "schools internal PE curriculum" ( $p<0.05$ ,  $C=0.101$ ), and "RS in school's internal PE curriculum" ( $p<0.001$ ,  $C=0.400$ ) were significantly related to "teaching RS in PE" (table 2).

Table 2. Displayed are different items and the percentage of teaching racket sports in PE within this groups.

		<i>Teaching racket sports</i>	
		Yes	No
<b>Total</b>		69.88% (348)	31.12% (150)
<b>Gender</b>	Male	73.20% (71)	26.80% (26)
	Female	69.08% (277)	30.92% (124)
<b>Practicing RS in leisure time*</b>	Yes	82.41% (164)	17.59% (35)
	No	61.54% (184)	38.46% (115)
<b>PE specialist*</b>	Yes	81.69 (232)	18.31% (52)
	No	54.21% (116)	45.79% (98)
<b>Work experience*</b>	1-5 years	57.33% (43)	42.67% (32)
	6-10 years	64.04% (57)	35.96% (32)

	11-20 years	80.23% (138)	19.77% (34)
	> 20 years	67.70% (109)	32.30% (52)
<b>Schools internal PE Curriculum*</b>	Yes	72.73% (264)	27.27% (99)
	No	62.22% (84)	37.78% (51)
<b>RS in schools PE Curriculum*</b>	Yes	86.07% (210)	13.93% (34)
	No	44.35% (51)	55.65% (64)

## Discussion

The present study aimed to investigate parameters that may impact the implementation of racket sports (RS) in PE classes at German primary schools using teacher-responses to an online questionnaire. Main findings were the anchoring of RS in roughly 68% of the school's internal PE curricula. Accordingly and in line with NRW school guidelines (MSW NRW, 200), nearly 70% of the participating teachers replied to teach racket sports in their PE classes. In particular the predefined questionnaire's items 'PE specialist', 'practicing RS during leisure time', 'work experience', 'school's internal PE curriculum' and 'RS in school's internal PE curriculum' showed significant impacts on 'teaching RS in PE', whereas the teacher's gender revealed no relation to 'teaching RS in PE'.

Among RS, playing basic setback games (59.77%) followed by badminton (54.6%) was most taught by primary school's PE teachers, outnumbering table tennis (20.69%) and tennis (14.66%). Resulting from a student's questioning, Gerlach et al. (2006) reported similar data. Based on sports-occurring frequencies, students replied that badminton (30%) was taught most frequent compared to table tennis (13.3%) or tennis (3.5%). Thus, our data supports previous results showing that badminton seems to be dominant among RS in the context of school's PE, particularly in primary school's PE.

Compared to generalist teachers (42.97%), the present study defined 57.03% of the participating PE teachers who had studied sports at a university level and, therefore, are considered to be 'PE specialists'. Although a different sports type, the present study's distributions are in line with Staub et al. (2017; i.e. 44.3% generalist teachers) as well as Brettschneider (2007; i.e. 49% generalist teachers) who reported similar distributions in swimming classes at primary schools.

The present study showed a significant impact on teaching RS, when teachers were defined as 'PE specialist' (81.69%) other than generalist teachers (54.21%). These findings support previous results on teaching differences between generalist teachers and PE specialists, generally suggesting PE specialists to exhibited higher levels of effective teaching behaviors compared to generalist teachers showing lower levels of activity in class (Faucette and Patterson, 1990; Faucette et al., 2002; Rink and Hall, 2008) and indicative for greater knowledge of PE specialists on specific motor skills which allowed to provide a more detailed feedback during their classes (Behets, 1996; Block and Beckett, 1990). Following this line of argumentation and based on the present study's findings, PE specialists may not only increase the implementation of RS in primary school's PE classes but further increase RS teaching quality. With Graber et al. (2008) as well as McKenzie and Kahan (2008) suggesting regular intensive in-service programs as well as continuous support that focus on improving pedagogical skills in primary school teachers, it may also be suggested to extend existing training programs for generalist teachers to eventually benefit PE teaching, particularly meeting primary school needs.

The present study's findings showed greater working experience to significantly impact the implementation of teaching RS in PE; this was most pronounced when teachers have taught PE between eleven and 20 years (80.23%) and declined when teachers have taught PE for longer than 20 years. Based on these findings it may be suggested that teaching RS in PE relates to specific periods of working experiences in which teachers seem to prefer the implementation of RS in PE. To the best of our knowledge there are no comparable publications who have investigated work experience and influence of choosing specific sports. However, Ruin (2017) found unusual values by PE teachers with a clustered work experience of 6-10 years and 11-20 years regarding subjective body images. Lipowsky (2006, pp. 53-54) sums up that work experience of generalist teachers plays a minor role on learning success and as an independent variable work experience is difficult to interpret. In contrast to learning success, our data suggests an influence of work experience in choosing specific sports in PE. Combined with findings of Ruin (2017), in particular PE teachers seem to be influenced by work experience.

The present study showed a significant impact on teaching RS, when teachers had a personal cue, e.g. by practicing RS in their leisure time. Previously, McKenzie et al. (1999) reported similar results, showing that primary school teachers who were physically more active themselves provided a higher quality in their PE classes, offering more time to their students to spent on physical fitness. In line with the present study's findings it seems reasonable that personally preferred sports are more frequently transferred into a teacher's PE class content.

The present study revealed no impact of the participating teacher's gender on teaching RS in PE (80.52% were female teachers). With this, the present study's participants were rather gender-imbalanced. However, according to statistics by IT.NRW (2014) for the school year 2012-13, the basic population of NRW's primary school PE teachers contain 88% female teachers. A similar participant's distribution was also reported by Staub et al. (2017; 81.3% female teachers). Therefore, the present study's gender distribution seems to reflect the basic population of NRW's primary school teachers.

#### *Limitations*

Despite careful consideration, the present study comprises a few limitations. Using an online-survey, distributed by email to the offices of almost all primary schools in NRW requesting to forward the online-survey to all PE teachers. The procedure was reactive, participation voluntarily and anonymous. According to Thielsch and Weltzin (2009) this has both advantages and disadvantages compared to a paper questionnaire. Allowing for a cost- and time-saving implementation, an online-survey is rather impersonal that may lead to less replies. Thus, the number of incoming replies of the present study may be criticized considering the fact that a potential number of over 20.000 teachers have taught PE at NRW's primary schools during the academic year 2012/2013. Further and following a first quantitative approach the present study's data collection may not serve qualitative analyses which eventually may limit the interpretation of findings.

#### **Conclusions**

The present study aimed to investigate parameters that may impact the implementation of racket sports (RS) in PE classes at German primary schools. It was shown that two out of three primary school teachers teach RS in their PE classes, in particular basic setback games and badminton. While gender had no impact on the decision to teach racket sports, four specific parameters have been identified to particularly impact the implementation of teaching RS in primary schools: the school's internal PE curriculum and, in particular, the listing of RS in this school's internal PE curriculum; the working experience; being a PE specialist; and – last but not least – the personal cue of e.g. practicing RS during leisure time.

Based on the present study's findings, it may be suggested that a change in study regulations, e.g. by offering extra-occupational courses to teachers, may benefit the implementation of RS in primary school PE, not necessarily to further outnumber other sports but to improve the quality of teaching RS in primary schools. However, future research is necessary to examine possible impact differences between parameters as well as between different racket sports, e.g. badminton, table tennis, and tennis.

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