ORIGINAL ARTICLE

Perspectives towards training approaches to skill achievement in swimming athletes: mixed methods

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Abstract

Background and Study Aim In recent years, the performance of swimming athletes in South Kalimantan Province has improved at the national level. The number of athletes in junior and student categories has also increased, and their average performance times have shown significant improvement. Therefore, further studies are needed to explore how coaches train swimming skills from the initial training stages to the development of athletes. This study aims to analyze the perspectives of swimming coaches on the training methods or approaches applied to athletes.

Material and Methods This research employed a mixed-methods approach, combining qualitative and quantitative methods. The sample consisted of ten coaches aged 35-55 years, with an average of 17.8±7.8 years of coaching experience. All participants had at least a B license and were former athletes. The qualitative method involved 30-40 minute interviews, while the quantitative method involved questionnaires covering coach-athlete communication (12 items), coaching style (10 items), and coach-athlete relationship (11 items), using a 1 to 5 scale.

Results The analysis revealed that training initially focuses on freestyle, backstroke, breaststroke, and butterfly strokes, with attention to technique evaluation. Endurance is the primary physical component, which changes with the athlete's specialization. Coaches determine athlete specialization based on ability, recommending participation in a few events with medal targets and maintaining the same events even with different strokes. During pre-competition and competition stages, coaches tailor specific training programs to the athlete's events. The concept of long-term athlete development (LTAD) is understood by coaches, although not consistently applied. Quantitative analysis showed that more than seven coaches achieved sufficient to excellent category results.

Conclusions The use of mixed methods in this study provides a comprehensive understanding of coaches' training approaches to developing swimming skills, as evidenced by athlete achievements. The study highlights the importance of applying long-term athlete development (LTAD) principles, as LTAD offers significant benefits to athletes across all sports.

Keywords: coaches, perspective, training approach, swimming

Introduction

Coaches are the most significant factor in athletes' achievements. Competent coaches must master all aspects of sports, including technique, tactics, physical conditioning, mentality, nutritional knowledge, and injury management [1-3]. Coaches are also required to have qualifications in their specific sport, such as tiered licenses and academic degrees in sports science [4]. Additionally, coaches play a crucial role in creating a training environment that enhances skills and prepares athletes for competition [5]. Ideally, a coach should possess all these competencies, with the most important being prior experience as an athlete, providing valuable competition insight [6]. However, having a competent coach does not guarantee that athletes will achieve their goals.

A significant challenge for coaches is ensuring that the training program is effectively communicated to athletes [7]. In swimming, coaches develop programs to enhance athletes' physical and technical components from the preparation stage to the competition stage. The focus shifts to more specific training methods tailored to the race [6, 8]. However, understanding the full extent of swimming skills that athletes must master through predefined

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training designs remains limited.

The training methods applied by coaches significantly impact athletes' progress in both technique and achievement. The success of swimming athletes is closely tied to how coaches set training methods, such as low volume, low intensity, high intensity, and high volume [9]. Swimming is a sport that focuses on time and speed, where efficient technique is crucial for securing first place. However, some coaches fail to monitor stroke rate, split times, and exertion [10]. While coaches are aware of the long-term athlete development (LTAD) model, it is rarely applied in daily practice [11]. The measure of swimming athletes' success is still uncertain, often heavily reliant on the coaches' ambitions. In practice, some coaches set performance targets for athletes during their teenage years. Commonly, coaches focus on mastering techniques before aiming for championship targets as the athletes mature into young adults.

However, coaches need to ensure that techniques are both correct and efficient, not just aiming for the fastest time. Therefore, further studies are needed to explore how coaches train swimming skills from the initial stages of training to the development of athletes. Previous studies have reported that coaches prefer to decompose tasks for swimmers, focusing more on specific swimming styles or race numbers rather than on individual athletes [12]. This study aims to analyze the perspectives of swimming coaches on the training methods and approaches they apply to athletes.

Materials and Methods

Participants

The study population consisted of swimming coaches in South Kalimantan province, selected using purposive sampling. The primary criterion was having trained athletes who have won medals in the National Sports Week (PON), a multi-event championship held every four years in Indonesia, with a rigorous selection process. The sample comprised ten male swimming coaches aged 35-55 years, with an average of 17.8±7.8 years of coaching experience. All participants held a minimum coach license of category 'B' and were former athletes.

This study employed mixed methods, combining qualitative and quantitative approaches to provide a comprehensive understanding of the research problem. The mixed method was chosen to explore qualitative insights from the sample, which were then analyzed quantitatively for broader applicability. In the qualitative phase, interviews were conducted with the coaches. Example questions included:

1. What are your stages in training prospective athletes?
2. How do you deliver the material?
3. According to you, what physical component do you practice first?
4. How do you specialize in training?

The coaches' responses to these questions provided insights into their training methods and approaches. In the quantitative phase, coaches were given a questionnaire to complete using a Likert scale. The questionnaire included questions on three dimensions: coach-athlete communication, coaching style, and coach-athlete relationship.

Procedure

The first stage of this study involved analyzing problems in swimming through observation. This included recording athletes' achievements from previous years and conducting unstructured interviews with athletes and coaches. However, the unstructured interviews with coaches were not conducted using the appropriate criteria for the study. In the second stage, after identifying the problem, evidence was gathered from published scientific articles. This stage aimed to prepare interview questions and questionnaire statement items for quantitative analysis. Validation was performed using a focus group discussion (FGD) during the instrument preparation, involving sports coaching lecturers who were experts in swimming and held at least a Doctoral degree. The third stage was data collection, conducted on Sundays when there were no training schedules. During this stage, coaches were interviewed for approximately 30-40 minutes. After the interview, coaches were asked to complete a questionnaire with statement items rated on a scale of 1 to 5 (1 'very poor', 2 'poor', 3 'fair', 4 'good', 5 'very good').

Statistical Analysis

The statistical analysis for this study was conducted using two methods, aligning with the mixed research design. Qualitative analysis of the interviews involved coding responses. For example, in response to the question, "How do you determine specialization in training?" if a coach mentioned anthropometry, it was coded as 1; if they mentioned physical components like endurance, strength, and speed, it was coded as 2; if they mentioned test results based on swimming skills like freestyle, butterfly, backstroke, and breaststroke, it was coded as 3. The purpose of coding was to present the results briefly and clearly. Coaches were also assigned codes; ten coach identities were given alphabetic codes (A, B, C, D, E, F, G, H, I, J). Quantitative analysis of the questionnaire responses used descriptive percentages, analyzed with the help of SPSS version 26 software.

Results

Qualitative Analysis

The qualitative analysis involved explaining the coaches' interview responses. Coaches described their methods for training prospective athletes, considering whether the athletes had prior swimming experience. Eight coaches (B, C, D, E, F, H, I, J) preferred athletes who showed courage in deep water, provided they had practiced swimming before. Coaches A and G explained that they teach prospective athletes how to float by observing their depth adaptation. This method involved using a circular rubber float around the athlete's body, asking them to dive for 2 or 3 seconds to adjust their breathing.

Furthermore, an analysis was conducted based on the preferred age for starting swimming training. All coaches preferred prospective athletes to begin training at an early age, between 5 and 10 years. According to coaches A, C, D, E, and H, children are easier to coach before they enter elementary school. Other coaches (B, F, G, I, J) mentioned that younger children are easier to motivate. During this stage, coaches take 4 to 6 months before progressing to the next material, which involves learning swimming strokes. Initially, all coaches provide training that involves swimming 25 or 50 meters using a float on the hands, with arms extended straight forward, focusing on footwork.

All coaches involved in this study agreed that the method was effective for training leg paddling strength and that it was easy and effective for freestyle training. When practicing freestyle with a hand float, some coaches (A, B, G, H, I) focused on teaching the correct breathing technique, while others (C, D, E, F, J) emphasized the rotation of the hands. At this stage, coaches did not specify a set time for combining hand movements with breathing. However, interviews with coaches B and F revealed that if an athlete trains at least four times a week, they can practice freestyle without a buoy within a month. All coaches believe that freestyle is an easy and flexible style, meaning it can be learned sooner or later. Freestyle is considered the most basic swimming style that prospective athletes must master. Once the athlete masters freestyle, they are introduced to the next swimming style.

Coaches use similar methods, with all coaches preferring the use of floats to learn the next swimming style. Coaches A, D, H, I, and J believe that using a buoy helps prospective athletes regulate hand, foot, and breath movements. This approach is supported by coaches B, E, and F, who explained that floats help train athletes' balance, while coaches C and G mentioned that floats aid in coordination training. Coaches could not provide a precise timeline for mastering freestyle, breaststroke, backstroke, and butterfly techniques, but they estimated about a year if the athlete starts training at an elementary school age (coaches A, D, G, H). While coaches did not specify the sequence of techniques learned after freestyle, they unanimously agreed that the butterfly stroke is taught last and in more detail. According to coaches F and J, even with a year of routine training, prospective athletes might not fully master the butterfly stroke. The butterfly stroke is taught last because it requires precise technique and a good rhythm of body, arm, and leg movements (coaches A, B, C, F, G, H, I). Besides the simultaneous arm movement, the legs perform a dolphin kick, necessitating more detailed supervision from the coach (coaches D, E, J).

In delivering training materials, coaches exhibit various characteristics. When discussing daily intensity and volume, the trainees are influenced before training begins. However, when teaching techniques, each coach has a unique approach. Coaches D, F, and I provide evaluations when the athlete is stopped, whereas coaches B and C evaluate while the athlete performs the swimming style, often using a shouting tone. In contrast, coaches A, E, G, H, and J provide evaluations both when athletes are stopped and while they are performing a swimming style. Coaches D, F, and I believe that athletes are more receptive to feedback when they stop training, allowing them to focus better during the training session. Meanwhile, coaches B and C feel that athletes can receive immediate feedback during training, enabling them to correct minor errors promptly based on the coach's instructions.

Despite these differences, the interviews revealed two commonalities among all coaches in delivering training material. First, when focusing on strengthening the foot paddle, coaches use a float on the athlete's palm. This method effectively allows for the evaluation and exercise of foot movements. Second, all coaches instruct athletes to practice hand-wheel movements at the edge of the pool before entering the water. This allows coaches to evaluate ineffective hand movements more easily and provide examples of correct hand techniques.

Furthermore, coaches have different opinions regarding the prioritized physical components for swimming athletes. This variation changes when athletes reach the ages of 12 to 15 years and beyond 15 years old, as the physical components are then adjusted according to their specialization. When athletes begin training, endurance is prioritized. According to coaches A, D, F, and J, endurance is the most important basic physical component because it enables athletes to adjust their swimming rhythm more efficiently and effectively. Coaches E, G, and I concur, adding that good endurance helps athletes cope with strenuous training programs, preventing early fatigue. Meanwhile, coaches B and C agree but also assess whether athletes have potential in medium or long-distance events such as 400 meters, 800 meters, or 1500 meters.

After the age of 12 to 15 years, coaches agree that the physical components trained become more varied with combination training methods. Besides endurance, speed becomes the dominant and most important physical component, as swimming is a sport where achieving the fastest time to the finish is crucial.

This combination is implemented based on targets to be achieved through a systematic training program. Coaches A, D, E, F, G, I, and J explained that they divide the preparation and competition stages into two phases. During the preparation stage, the focus is on building endurance and evaluating swimming techniques. As the pre-competition stage approaches, the training is adjusted according to the specific race events.

The seven coaches (A, D, E, F, G, I, J) recommend race events for athletes and allow them to choose which events to participate in, without imposing their preferences on the athletes. In contrast, coaches B, C, and H plan the training program based on the race events they recommend. For instance, if an athlete decides to compete in the 100 meters freestyle, the training program from the preparation stage to the competition will focus on that event.

There are two clear approaches among the coaches. Coaches A, D, E, F, G, I, and J tend to encourage athletes to participate in multiple events, adjusting to the athlete's capabilities at the time. This could include 50 meters freestyle, 100 meters freestyle, 50 meters breaststroke, 100 meters breaststroke, 50 meters backstroke, 100 meters backstroke, 200 meters medley, and relay events. On the other hand, coaches B, C, and H prefer to limit the number of race events but aim to achieve specific targets, such as the 100 meters freestyle, 100 meters breaststroke, and 100 meters backstroke. These coaches also advise athletes to choose events with the same distance (e.g., 100 meters) even if they involve different strokes.

After athletes turn 15 or enter high school, specialization is determined. Coaches have different principles for this process. Coaches A, E, and G base specialization on the athlete's winning record in races. Coaches D, F, I, and J use anthropometry, such as height and other physical tests, to determine specialization. Coaches B, C, and H consider the opportunities for athletes to win at the provincial level and qualify for national competitions. As a result, athletes typically choose two to three swimming styles with the same distance, such as 50 or 100 meters.

From the analysis of the 10 coaches, athletes tend to prefer freestyle, breaststroke, and backstroke, with very few choosing butterfly. Those who do choose butterfly usually compete in the 50 and 100-meter events. Middle and long-distance events like the 400, 800, and 1500 meters freestyle are also less popular among athletes, with a preference for the 400 and 800 meters.

Once athletes have specialized in a swimming style, their training programs focus on re-evaluating their strokes. This specialized training intensifies during the pre-competition and competition stages. During the preparation stages, such as general and special preparation, coaches emphasize endurance and technique.

The interviews also revealed that coaches are familiar with the concept of long-term athlete development (LTAD), although their understanding is not complete. Coaches A, C, D, E, F, and G believe that applying LTAD to prospective swimming athletes is easier before the age of 10. At this age, coaches can better predict an athlete's potential at 20 years old. Additionally, children under 10 have good flexibility and coordination, making it easier for them to absorb the material provided by the coach.

However, coaches B, H, I, and J expressed concerns about the risk of overtraining when implementing LTAD. They noted that while they set appropriate training targets and programs, some parents push their children to become champions at an early age, complicating the application of LTAD. Despite these challenges, coaches acknowledged that it is not impossible to apply LTAD to swimming.

According to the coaches, athletes who consistently win competitions at the national and international levels by around 25 years old are those who follow their coaches' guidance and maintain good communication. Parental support for the coach's program and the athlete's motivation are crucial. Thus, openness and trust are essential factors, in addition to the competencies of swimming coaches in South Kalimantan.

Quantitative Analysis

This quantitative analysis reports the results of a questionnaire addressing three main factors: coach-athlete communication [13, 14], coaching style [15], and coach-athlete intimacy [16, 17]. Each factor was adapted from previous studies, with statement items modified to suit the sample, i.e., swimming coaches. The results are presented using descriptive percentages.

Coach-athlete communication includes three aspects: creating a positive atmosphere, fostering open dialogue, and providing feedback. These aspects generated 11 statement items. The analysis results for coach-athlete communication factors are presented in Table 1.

Table 1. Coach-Athlete Communication Ratings

No	Interval	Category	Frequency	%
1	59.75 < 60	Very good	1	10
2	56.85 < 59.75	Good	4	40
3	53.95 < 56.85	Fair	4	40
4	51.05 < 53.95	Poor	0	0
5	50 < 51.05	Very Poor	1	10
	Total		10	100

Based on the results in Table 1, coach-athlete communication was rated as "very poor" for one coach, "fair" for four coaches, "good" for four coaches, and "very good" for one coach.

Furthermore, there are two aspects to training style: democratic and authoritarian. These aspects generated 10 statement items. The analysis results for coaching style factors are presented in Table 2.

Table 2. Coaching Style Ratings

No	Interval	Category	Frequency	%
1	49.10 < 50	Very good	1	10
2	47.10 < 49.10	Good	2	20
3	45.10 < 47.10	Fair	4	40
4	43.10 < 45.10	Poor	2	20
5	43 < 43.10	Very Poor	1	10
	Total		10	100

Based on the results in Table 2, it is found that one coach falls into the "very poor" coaching style category, two coaches into the "poor" category, four coaches into the "fair" category, two coaches into the "good" category, and one coach into the "very good" category.

There are three aspects of the coach-athlete relationship: intimacy, commitment, and complementarity. These aspects generated 11 statement items. The analysis results for coach-athlete relationship factors are presented in Table 3.

Table 3. Coach-Athlete Relationship Ratings

No	Interval	Category	Frequency	%
1	54.05 < 55	Very good	1	10
2	51.75 < 54.05	Good	5	40
3	49.45 < 51.75	Fair	2	20
4	47.15 < 49.45	Poor	2	20
5	47 < 47.15	Very Poor	1	10
	Total		10	100

Based on the results in Table 3, the coach-athlete relationship is rated as "very poor" for one coach, "poor" for one coach, "fair" for two coaches, "good" for five coaches, and "very good" for one coach.

Discussion

The initial approach taken by swimming coaches is quite straightforward: ensuring that individuals or prospective athletes are not afraid of water. This is followed by teaching foot paddling movements using various types of buoyancy aids. Footwork not only helps individuals prevent drowning but also makes their movements faster, more dynamic, and balanced [18, 19]. To achieve athletic success, coaches introduce techniques and strokes starting with the easiest: freestyle, backstroke, breaststroke, and finally, butterfly.

For prospective athletes, the primary physical component trained is endurance. For athletes aged 15 and above, who are approaching adulthood, training focuses on a combination of speed and endurance, depending on the race type. This method aligns with previous research studies, which also suggest that freestyle should be the initial stroke introduced and that endurance should be the first physical component to be trained [20, 21].

Factors in the training approach also vary, such as the age at which the athlete first begins training with a swimming coach. The results show that coaches pay more attention to athletes who start training between the ages of 5 and 10. Starting training at this age allows athletes to develop faster movement capabilities by age 17 [22] and enhances flexibility, as well as broadening the shoulder spine [23]. Thus, beginning training at an early age ensures the training program runs appropriately without rushing to achieve targets.

Communication and training style are crucial in this process. Effective communication helps convey training programs, especially as athletes progress to more challenging levels, preventing complaints and maintaining motivation [24]. The quantitative analysis of coach-athlete communication revealed that nine coaches demonstrated sufficient to very good levels of communication.

Training style also significantly impacts performance, as a well-defined and consistent training program enhances athlete skills [8, 25]. The quantitative analysis of coaching style showed that seven coaches demonstrated sufficient to very good levels of training style.

The effectiveness of the training model plays a crucial role in athlete achievement, as it is evidenced by the athletes' performance in competitions [26, 27]. When athletes consistently win in the same events and styles, the training program can be deemed effective. According to the coaches' interview responses, special and specific training methods are applied during the pre-competition and competition stages, highlighting differences in coaching approaches. These differences may be influenced by the coaches' background, experience, and education [28].

The training method must be tailored to the athlete's abilities. Previous research indicates that training methods during the pre-competition and competition stages are often based on the coaches' experience [29, 30]. Evaluating the effectiveness of training methods solely on the number of achievements is insufficient; it must also be supported by analyzing the coach-athlete relationship [2]. This analysis helps predict whether the training method is appropriately suited to the athlete. The quantitative analysis of the coach-athlete relationship revealed that seven coaches had a sufficient to very good relationship with their athletes.

Furthermore, discussing long-term athlete development (LTAD) is crucial for the process of coaching athletes over the long term. Many sports have adopted the LTAD concept, primarily targeting athletes with potential and talent identified at a young age [31, 32]. In contrast, athletes who lack potential or talent receive less attention and are given separate training [33]. Applying LTAD has numerous benefits, including achieving athlete success more quickly and avoiding early retirement [10, 34]. Additionally, LTAD enhances athlete well-being by improving psychological health, preventing injuries, and avoiding overtraining [35].

Therefore, implementing the LTAD concept is best started by screening prospective athletes at the elementary school level and incorporating swimming into the physical education curriculum [36, 37, 38, 39].

The biggest challenge for coaches, based on interview results, is to apply the right approach through an appropriate training program, an assertive yet democratic coaching style, discipline, and establishing good relationships with both athletes and their parents. Many athletes quit at a mature age due to incompatibility with the training program or the coach's character. However, many athletes succeed at the international level because of effective coaching.

The limitation of this study is the small sample size, which may affect the accuracy of the results. Additionally, the presentation of interview results tends to combine answers from several coaches for better reader understanding. It is hoped that this study provides valuable insights, particularly for coaches or swimming athletes pursuing a bachelor's degree in sports, to focus on the right approach to coaching swimming athletes.

Conclusions

Coaches employ different approaches to developing swimming skills, supported by proven records of athlete achievement. In the initial training stage for prospective athletes, freestyle, backstroke, breaststroke, and butterfly techniques are always considered and evaluated. Endurance is the foundational physical component developed by the coach, though it will be adjusted according to the race characteristics and chosen style. Coaches also follow guidelines indicating that the pre-competition and competition stages are ideal for more specific training tailored to the upcoming races.

The quantitative analysis reinforces the interview evidence, showing that coach-athlete communication, coaching style, and coach-athlete relationships did not yield poor results, with more than seven coaches rated in the sufficient to very good categories. An important finding of this study is the necessity of applying long-term athlete development (LTAD) principles. This can be achieved through seminars or coach competency training, as LTAD provides significant benefits to athletes across all sports.

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