PRINCIPLE-BASED PROGRAM DESIGN—A PRACTICAL, STEP-BY-STEP GUIDE

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It is often said that physical training is "both an art and a science." However, because one cannot dissociate the art from its foundational science (i.e., training principles and best available evidence), programming is really "the art of applying the science." Unfortunately, although most resources on program design review the foundational scientific principles of training, they often fail to provide practical strategies that strength and conditioning professionals need in order to apply these principles successfully when designing programs. To help bridge the gap between science and application, this article provides strength and conditioning professionals a simple and practical, step-by-step system for applying the scientific principles of training into the program design process.

TRAINING PRINCIPLES VS. TRAINING METHODS

Many strength and conditioning professionals claim that they base their programs on the foundational principles of training. But many of these same strength and conditioning professionals will look at a training program and judge it as "good" or "bad" simply based on whether it uses exercises or training methods that they have a bias towards. This method of judgment clearly demonstrates that they are putting training methods before training principles. It is important to understand that the word "foundational" denotes an underlying basis, principle, or fundamental aspect. When this definition is applied to programming, it becomes clear, contrary to popular belief, that there are no foundational exercises, just conventional and unconventional exercises and foundational training principles. It is the principles that dictate that the best exercises are included in a comprehensive training program. With that reality established, it becomes clear that a well-designed exercise program is not determined by whether or not it includes any particular types of exercises or training style; what determines a good program is how well it applies and adheres to the foundational principles of training, such as individuality, progressive overload, specificity, and variety. In other words, it is the training principles that determine the types of training methods that need to be utilized in the program, not the other way around. With this reality in mind, strength and conditioning professionals who have a better grasp of how to apply principles will have a much greater understanding of exercise methods, and therefore, should be able to design more effective exercise programs.

WHAT PROGRAM DESIGN REALLY IS

Programming is really a process of decision-making. This article provides a system for making decisions based on principles when designing exercise programs. This decision-making process should be guided by the following series of questions:

1. What are the client's or athlete's training goals and what types of exercises and training methods need to be applied to achieve these goals?
2. Which of these types of exercises and training methods will the client or athlete be able to do/not able to do based on their ability and training environment?
3. How can overload be provided to these exercises and training methods to ensure progress?
4. How can these exercises and training methods be varied to continue to create a positive adaptation to the training program (i.e., training stimulus) without reaching the point of accommodation, where the client or athlete stops adapting positively?

It is obvious that the first question provides the prerequisite knowledge one needs to be able to answer the next. So, although each of these questions are individually important to answer in order to optimize program design, they are interdependent components that operate best when used in an order of hierarchy.

THE HIERARCHY OF TRAINING PRINCIPLES

Due to the fact that each of these successive questions correlate with a principle of training—question one with the principle of specificity, question two with the principle of individuality, question three with the principle of progressive overload, and question four with the principle of variation—these principles should be addressed and applied in this specific order of hierarchy:

1. Specificity
2. Individuality
3. Progressive overload
4. Variation

Due to the nature of how the previous principle in this order of succession provides one with the prerequisite knowledge needed to accurately apply the next principle in the sequence, this article proposes that the strength and conditioning professional cannot properly apply any of these principles without first knowing the information that comes from applying the previous principle in the hierarchy. Therefore, these principles should be viewed, not as generic training concepts, but as interrelated training components that are best applied in the order of hierarchy.

STEP 1: APPLY THE PRINCIPLE OF SPECIFICITY

The principle of specificity dictates that the adaptations to training will be specific to the demands the training puts on the body (6). Since the purpose of programming is to create the appropriate training stimulus to elicit specific adaptions, the first step in the programming process is to determine the desired training goals. This is because the training goals ultimately determine the types of exercises and methodologies that need to be part of the workout program.

Specificity in training can be accomplished by targeting muscle groups, energy systems, speed of movement, movement patterns, and/or muscle action types (4). For example, if a client's or athlete's goal is to become more explosive, the program should include explosive exercises (i.e., power exercises). If a client or athlete has a multifaceted goal, such as improving physique, performance, and overall health, then their program requires several training components because no single type of training will sufficiently address all of their demands (7).

STEP 2: APPLY THE PRINCIPLE OF INDIVIDUALITY

Once the strength and conditioning professional establishes the types of exercises and training methods that will elicit the desired adaptions, the next step is to apply the principle of individuality. This can be done by analyzing which of these exercises and methods will best fit the individual's ability and training environment.

With regards to the client's or athlete's ability, one of the most common training mistakes involves trying to fit the individual to the exercise instead of fitting the exercise to the individual. Some exercises just do not fit well with certain bodies. Each human being moves differently, based on size and shape, which is dictated by each individual's unique skeletal framework and body proportions. In addition, injury, loss of cartilage, and natural degenerative processes in joints (e.g., arthritis) can influence how individuals move. For these reasons, trying to fit every person into the same exercise movement is potentially dangerous. If doing so goes against an individual's movement capability, it could cause a new problem or exacerbate an existing one. Therefore, the strength and conditioning professional should carefully choose the particular exercises that best fit how each individual client or athlete moves.

With regards to training environment, once it is established which exercises best fit a client's or athlete's ability, the strength and conditioning professional should then determine which of these exercises best fit within the training environment available to the individual. This is because certain training environments (e.g., overly crowded, small, or home gyms) are not conducive to performing certain exercises due to equipment and space limitations.

STEP 3: APPLY THE PRINCIPLE OF PROGRESSIVE OVERLOAD

The principle of progressive overload refers to the systematic modification of a training program over time. In addition to exercise intensity, progressive overload also refers to frequency and increasing the difficulty of exercise selection (e.g., advancement from low-skill to high-skill exercises) (1). In applying the principle of progressive overload to using specific exercises, the strength and conditioning professional should look for improvements in volume, intensity, movement quality and efficiency, endurance, and recovery. The principle of specificity dictates that the overload method(s) chosen should be specific to the desired adaptation (6). For example, if a client or athlete is training to improve strength, they could gradually add heavier loads or perform more repetitions with the same load.

It is important to note that exercises should be progressed on an individual basis rather than a pre-determined schedule. The strength and conditioning professional should base their progressive overload on a client's or athlete's ability level and speed of adaptation. This highlights why the principle of progressive overload is best applied in the programming process after applying the principles of individuality and specificity.

STEP 4: APPLY VARIATION

The strength and conditioning professional's programming objective is to create a positive adaptation to the training program (i.e., training stimulus) without reaching the point of accommodation, where the client or athlete stops positively adapting or experiences a decrease in performance. Due to the adaptive properties of the human body, the principle of progressive overload will only take the client or athlete so far. Eventually the client or athlete will reach a plateau and be unable to keep progressively overloading the same exercise movements. This is why variation is important to consider after the principle of progressive overload.

Variation requires planned changes in exercise selection and training variables. This usually involves changing the exercises employed in the program and/or modifying the order of the exercises. As a general guideline, changing the program every 3 – 5 weeks may provide the body enough time to adapt. Improved neuromuscular coordination and increased muscle hypertrophy have been shown to occur in the early stages (the first 3 – 5 weeks) of a training program or when starting a new program (2,3,5). However, it usually is not long enough for the body to accommodate to the training stimulus when the program becomes stale and is much less or no longer beneficial.

It is important to note that when applied properly, variation does not conflict with the specificity and progressive overload principles. This is because any good, long-term training program should have enough consistency to allow for continued progress

and variety to prevent boredom, staleness, and potential repetitive stress injury. It is also important for the strength and conditioning professional to remember that a multitude of exercise variations exist not only to diversify a training program but also to provide variations to account for individualized movement patterns.

CONCLUSION

Properly applying the principles of specificity, individuality, progressive overload, and variation (in that order) is a proven method behind program design that all strength and conditioning professionals should follow. If strength and conditioning professionals use this simple, principle-based decision-making process as a general guideline, it can lead to the creation of fundamentally sound and well-rounded programs that help clients and athletes train at optimal levels.

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