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Program Support Notes

Grades 7 - College

28mins

Fitness Training Series **Training Principles**

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Training Principles - Fitness Training Series

For Teachers:

Introduction

To maintain and improve performance in any given sport or physical activity, it is essential to train. Not only does an effective training program allow the athlete to develop the specific fitness components required for the sport, but it assists the body systems to function more effectively as well as maximizing the efficiency of the body's energy systems.

Designing and using an appropriate training program for an athlete at any level is not straightforward. There are many factors to be considered, and a training program should be tailored to an individual's needs and physical capabilities.

With the assistance of former Soccerroo and current head coach of the AIS Men's Soccer Program, Steve O'Connor, as well as Dean Kinsman – the current head coach of the AIS Women's Basketball Program, this program will introduce the viewer to the concepts of training principles and methods, discuss a number of considerations to take into account when planning a program, and examine the acute and chronic physiological responses to training.

Training Principles is the second in a three-part series which covers all aspects of developing an effective training program.

The following areas are covered in this program:

- Training principles
- Considerations when developing a training program
- Training methods
- Physiological responses to training – acute & chronic

DVD Timeline

00:00:00	Introduction
01:38:00	Training principles
05:40:12	Summary
06:20:05	Considerations when developing a training program
10:16:17	Summary
11:03:11	Training methods
15:39:24	Summary
16:30:07	Physiological responses – acute
20:04:03	Summary
20:53:08	Physiological responses – chronic
25:01:01	Summary
25:52:18	Conclusion
26:46:09	Credits
27:20:08	End program

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Student Worksheet:

Before Viewing the Program

1. Observe a local sporting team during a training session (or a school sports team at lunch time).
 - a) List all activities/drills, providing a brief explanation of each.
 - b) What do the athletes do to prepare their bodies for the training drills?
 - c) What fitness components are being developed?
 - d) Describe one of the activities/drills in detail. Comment on how is this activity relevant to the sport?
 - e) What activities are completed at the conclusion of the session as a 'warm-down'?
2. Working in groups of three, each student needs to record their resting heart and respiratory rates. Each student then needs to have his/her heart rate and respiratory rate measured during or after each of the following activities:
 - a) Lying on your back
 - b) Sitting
 - c) Jogging 200m
 - d) Sprinting 200m
 - e) Performing 20 sit-ups
 - f) Holding an isometric contraction in a push-up position for 30 seconds
 - g) Performing step-ups for 1 minute

Results can be recorded in the following table:

Exercise	Subject 1	Subject 2	Subject 3	Average
Rest				
a				
b				
c				
d				
e				
f				
g				

At the conclusion of these activities, students need to answer the following questions:

- a) Produce a column graph to record your results.
- b) What effect does physical activity have on your heart rate? Use data from your graph to support your answer.
- c) What effect does physical activity have on your respiratory rate? Use data from your graph to support your answer.
- d) Is there a relationship between your heart rate and respiratory rate? Explain.
- e) Did you observe any other changes in your body due to the physical activities?

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While Viewing the Program

1. Define "Physical Fitness"

2. For each of the following components of fitness, name one activity, sport or skill that uses the specific fitness component:

- a) *Cardiovascular fitness*

- b) *Anaerobic power*

- c) *Muscular strength*

- d) *Muscular endurance*

- e) *Flexibility*

3. Name the three different energy systems used by the body during physical activity.

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4. Which major body systems does fitness training have a great effect on?

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5. Define each of the following training principles:

a) *Duration*

b) *Frequency*

c) *Intensity*

d) *Progressive overload*

e) *Specificity*

6. Explain each of the following considerations that should be taken into account when planning a training program.

a) *Diminishing returns*

b) *De-training*

c) *Variety*

d) *Periodisation*

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7. Explain why warming up prior to participating in physical activity is so important:

8. List four recovery strategies that are beneficial after participating in physical activity.

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9. Name and describe four of the different training methods that an athlete can use to improve their fitness.

a)

b)

c)

d)

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e)

f)

g)

10. What acute responses will an athlete experience after commencing physical activity?

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11. Explain what 'tidal volume' is.

12. What is 'arteriovenous oxygen difference'?

13. What chronic adaptations will an athlete's body experience as a result of regular training?

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14. Explain 'cardiac hypertrophy'.

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After Viewing the Program

1. Nathan is aiming to be selected in the Victorian triathlon squad. In order to achieve this he has to perform exceptionally well in swimming, cycling and running time trials at a training camp, which is now only 3 weeks away. He has developed a training program which incorporates each of the three disciplines (swimming, cycling, and running). His training program is as follows:

	Swimming	Cycling	Running
<i>Monday</i>			
<i>Tuesday</i>			
<i>Wednesday</i>			
<i>Thursday</i>			
<i>Friday</i>			
<i>Saturday</i>			
<i>Sunday</i>			

He has been following this exact program for 8 weeks now. Initially he felt as though his fitness was improving, but lately this hasn't been the case.

- a) Why isn't Nathan's fitness continuing to improve even though he is still training regularly?
 - b) What could he do in order to improve his fitness before the training camp?
 - c) Develop a training three-week training program to enhance his chances of being selected in the squad, keeping in mind the principles of training.
2. Sarah has been competing in swimming for 2 years now. She trains three or four mornings per week, and competes on most weekends during the summer. The end of the swimming season is a month away, meaning that all of the major swimming championships are only just around the corner. However lately she has lacked the motivation to train, and often finds it boring.
 - a) What factors could cause this lack of motivation and boredom?
 - b) What could Sarah or her swimming coach do to increase her motivation and make swimming training fun and enjoyable?
 3. Divide into groups of 3-4. Each group must choose a different training method. Your group's task is to plan a ten-minute activity that briefly demonstrates your chosen training method to the class.

Prior to the lesson you need to give your teacher:

- a) A definition or explanation of your group's training method
 - b) A written description of the activity
 - c) A diagram of the activity
 - d) An equipment list
4. You are a member of the local football club, and the coach of the U/16 team has asked you to take a training session. You turn up to the ground having planned a skill-development session which was to be done on the oval, however due to the dry conditions the local council has been forced to close the oval. Instead you can use the clubrooms under the condition that balls are not to be used inside. You have accessed a large amount of equipment and are advised by the senior coach to do circuit training.
 - Develop a ten-station circuit aimed at covering the fitness components used during a game of football. It will be a fixed-time circuit, with participants doing each activity for 30 seconds before moving to the next.. List and describe each of the 10 activities, indicating why the activity is relevant to the sport and state what fitness component it is developing.

Suggested Student Responses

While Viewing the Program

1. Define "Physical Fitness"
 - *A general state of health and wellbeing which is made up of regular physical activity, good nutrition and regular recovery periods.*
2. For each of the following components of fitness, name one activity, sport or skill that uses the specific fitness component:
 - a) **Cardiovascular fitness**
Various Answers
 - b) **Anaerobic power**
Various Answers
 - c) **Muscular strength**
Various Answers
 - d) **Muscular endurance**
Various Answers
 - e) **Flexibility**
Various Answers
3. Name the three different energy systems used by the body during physical activity.
 - *ATP-PC*
 - *Lactic Acid*
 - *Aerobic*
4. Which major body systems does fitness training have a great effect on?
 - *Cardiovascular/circulatory system*
 - *Respiratory system*
5. Define each of the following training principles:
 - a) **Duration**
Duration is the period over which a program lasts.
 - b) **Frequency**
The number of training sessions within a period of time, usually per week.
 - c) **Intensity**
Refers to the exertion level at which training is done.

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d) Progressive overload

Involves increasing aspects of training such as distance, time, recovery time, number of sessions per week and weights used in resistance training.

e) Specificity

The principle of replicating components of a sport in the training program.

6. Explain each of the following considerations that should be taken into account when planning a training program.

a) Diminishing returns

Refers to amount of improvement a person makes as a result of training.

b) De-training

Results in a loss of condition due to a reduction in the amount of training.

c) Variety

Involves changes of routine, such as in the surfaces used, types of training, types of activities etc, to keep the athletes enjoying the training.

d) Periodisation

Organizing a training year into phases where each phase has specific aims for an athlete's development.

7. Explain why warming up prior to participating in physical activity is so important:

- *Increases elasticity of the muscle, which is essential for good performance and injury prevention.*

8. List four recovery strategies that are beneficial after participating in physical activity.

- *Warming-down*
- *Stretching*
- *Massage*
- *Hydrotherapy*

9. Name and describe four of the different training methods that an athlete can use to improve their fitness.

a) Continuous training - *undertaking any activity that requires aerobic activity for at least 20 minutes – for example, running, cycling, cross country skiing and aerobic exercises. It is sub-maximal, and to be effective needs to keep the heart beating at around 75% of its maximum rate.*

b) Fartlek training - *involves regular changes of pace. It might be achieved through hills or obstacles on the training track; or a series of short sprints combined with slower jogging or walking.*

c) Interval training - *involves intervals of work followed by intervals of rest or recovery. It can be designed for specific energy systems. The length of time of intervals determines which energy system benefits.*

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- d) **Resistance training** - builds muscular strength and endurance. It involves the use of weights, or a resistance force.
- e) **Plyometrics training** - exercises based on scientific findings that muscle development benefits rapid changes of lengthening and shortening while resistance is being applied. They often involve hopping and jumping, or equipment like medicine balls.
- f) **Circuit training** - training involves moving between stations on a circuit, where different exercises are carried out.
- g) **Flexibility training** - involves stretching and extending various muscle groups to achieve higher levels of flexibility.
10. What acute responses will an athlete experience after commencing physical activity?
- More oxygen is taken in
 - Increased ventilation or respiratory rate
 - Increased heart rate
 - Increased tidal volume
 - Increased oxygen uptake
 - Increased stroke volume
 - Increased cardiac output
 - Increased venous return
 - Increased blood flow to muscles
 - Increased number of contractions in both slow and fast twitch muscle fibers
 - Increased muscle temperature
 - Increased enzyme activity around the muscles
11. Explain what 'tidal volume' is.
- The amount of air taken in (inspired) and out (expired) with each breath.
12. What is 'arteriovenous oxygen difference'?
- The difference between the concentration of oxygen in the arteries and the veins.
13. What chronic adaptations will an athlete's body experience as a result of regular training?
- Cardiac hypertrophy
 - Decreased heart rate
 - More efficient oxygen uptake
 - More efficient use of oxygen
 - Increased number of capillaries in the muscles (a result of endurance training)
 - Decreased blood pressure during rest and sub-maximal exercise
 - Increased arteriovenous oxygen difference
 - Increased tidal volume
 - Increased ventilation
 - Increased VO_2 Max.
 - Improved lung function
 - Increased surface area of the alveoli
14. Explain 'cardiac hypertrophy'.
- An increase in ventricular size (increase in the size of the heart). This allows more blood to be pumped in and out of the heart, leading to greater stroke volume and cardiac output.

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Other Relevant Programs Available from VEA

Analyzing Fitness - Fitness Training Series
Training Programs - Fitness Training Series
Training Awareness - Acute Responses and Chronic Adaptations
Promoting Participation in P.E. - The National Physical Activity Guidelines
Measurements of Physical Activity

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