

TRAINING CONCEPTS AND TRAINING METHODS

Pre-Ph.D. Course Work (Physical Education)

C.S.J.M. University, Kanpur

Dr. Shri Krishna Patel

Associate Professor & Principal (I/c)

D.A.V. Training College, Kanpur

CONCEPTUAL TERMINOLOGY: PLAY, GAME, SPORTS, COMPETITIONS

1. **Play** → Play is an activity which is free, unproductive, uncertain, separate, governed by rules and make believe.
2. **Games** → A planned competitive activity based on fixed rules with a beginning and end.

Types of Games

- A. **Invasion Games** → Where territory is gain to score goals eg. Football, hockey.
 - B. **Target Games** → Two roles are played alternately e.g. Cricket.
 - C. **Code Games** → Wall / net separate the alternate players.
3. **Competition** → It is a contract to compete with & against time, distance, height, other competition, and the environment, the self for intrinsic and possibly extrinsic reason.

खेल
ऐसी गतिविधियाँ जिनमें बिना किसी अव्यक्त प्रयोजन के
व्यक्ति को तात्कालिक आनंद एवं प्रसन्नता मिलती है
PLAY
(Activities from which you get immediate
pleasure without ulterior motive)

समय
आपसी तालमेल से निश्चित
किया जाता है
TIME
(decided by agreement)

स्थान
आपसी तालमेल से निश्चित
किया जाता है
SPACE
(decided by agreement)

आनंद उन्मुख
ENJOYMENT
ORIENTATED

आंतरिक मूल्य
स्वयं के लिए
INTRINSIC VALUE
(for its own sake)

स्वाभाविक
बिना किसी पूर्वनिर्धारित
नियमों के अनुसार
SPONTANEOUS
(without predetermined rules)

अनुत्पादक होने के कारण
गंभीरता की कमी
(non-serious because
it is non-productive)

Definition of Sports.

Any form of physical activity which has a character of play and which take the form of struggle or involves competition with other is a sport.

तन्मयता (प्रतिभागिता के लिये प्रतिबद्धता)
 PREOCCUPATION (committed to participate)



शारीरिक कौशल (विशिष्ट योग्यता एवं जटिल कौशलों में प्रवीणता)
 PHYSICAL PROWESS (exceptional fitness and complex skill)

शारीरिक प्रयत्न (सशक्त शारीरिक प्रयास)
 PHYSICAL ENDEAVOUR (vigorous physical exertion)

खेल (प्ले की विशेषता, किन्तु स्वयं के साथ संघर्ष एवं दूसरों के साथ प्रतियोगता)
SPORT (character of play, but a struggle with oneself or competition with others)

खेल भावना (न्यायपूर्ण व्यवहार: मनोदशा का परीक्षण जहां बेईमानी का आशय है स्वप्रयासों की विफलता)
SPORTSMANSHIP (fair play: a test of temperament where to cheat is to lose a personal battle)

व्यक्तिगत उत्कृष्टता के लिये प्रयासरत (स्वयं का सर्वश्रेष्ठ देने का प्रयत्न)
STRIVING FOR PERSONAL EXCELLENCE (to do one's best)

प्रतिस्पर्धात्मक वातावरण में मित्रता को आगे बढ़ाना (जीवंत अनुभवों का आदान-प्रदान: टीम, शिष्ट: के साथ जीत एवं उदारतापूर्वक हार को स्वीकार करना)
FRIENDSHIP FORGED IN A COMPETITIVE FURNACE (a vital experience shared: a team, able to win gracefully and lose generously)

ओलम्पिज्म (सबसे महत्वपूर्ण बात जीत नहीं अपितु प्रतिभागिता करना है जैसे कि जीवन में सबसे महत्वपूर्ण बात विजय नहीं अपितु संघर्ष करना है)
OLYMPISM (the most important thing is not to win but to take part, just as the most important thing in life is not the triumph but the struggle)

CONCEPTUAL TERMINOLOGY: TRAINING, CONDITIONING, COACHING, SPORTS TRAINING

- ❑ **Training** - Any organized and systematic instructional process of preparing an individual for any event or job
- ❑ **Conditioning** – It is a process of gradually preparing the body for strenuous physical activity thus focusing attention in development of physical and motor fitness components and indirectly enhancing sports performance.

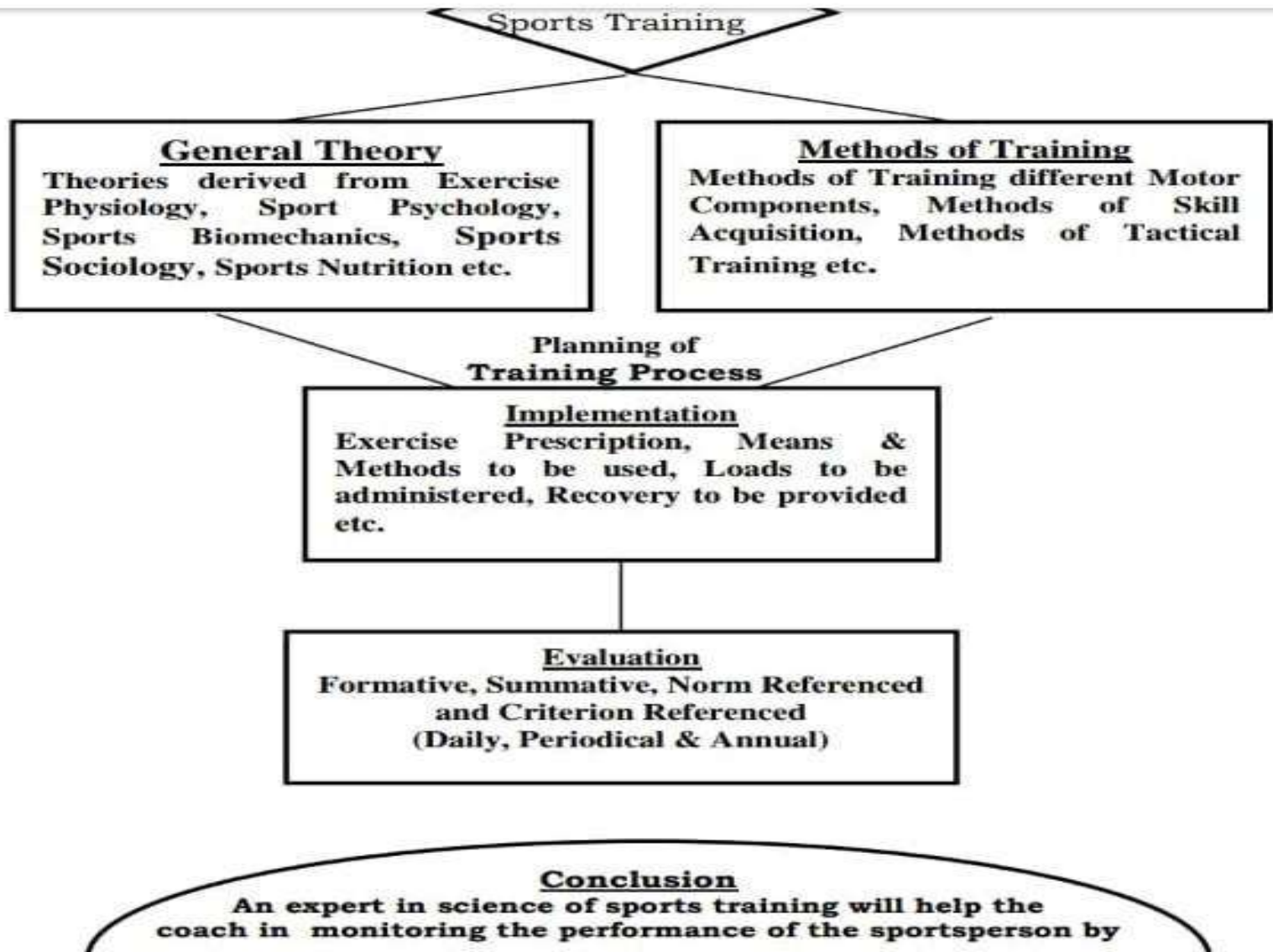
The basic tenets of any conditioning program are

- 1. To recognize the major energy source utilized in performing a given activity*
- 2. Then through the overload principle, to construct a program that will develop that particular energy source more than will any other.*
- 3. The primary energy system for any activity can be estimated on the basis of its performance time*

Coaching - Coaching described as a technical skill which involves co-ordination of factors like time sequence, action movement, and speed to enable a sportsman to attain highest level of efficiency in specific sports.

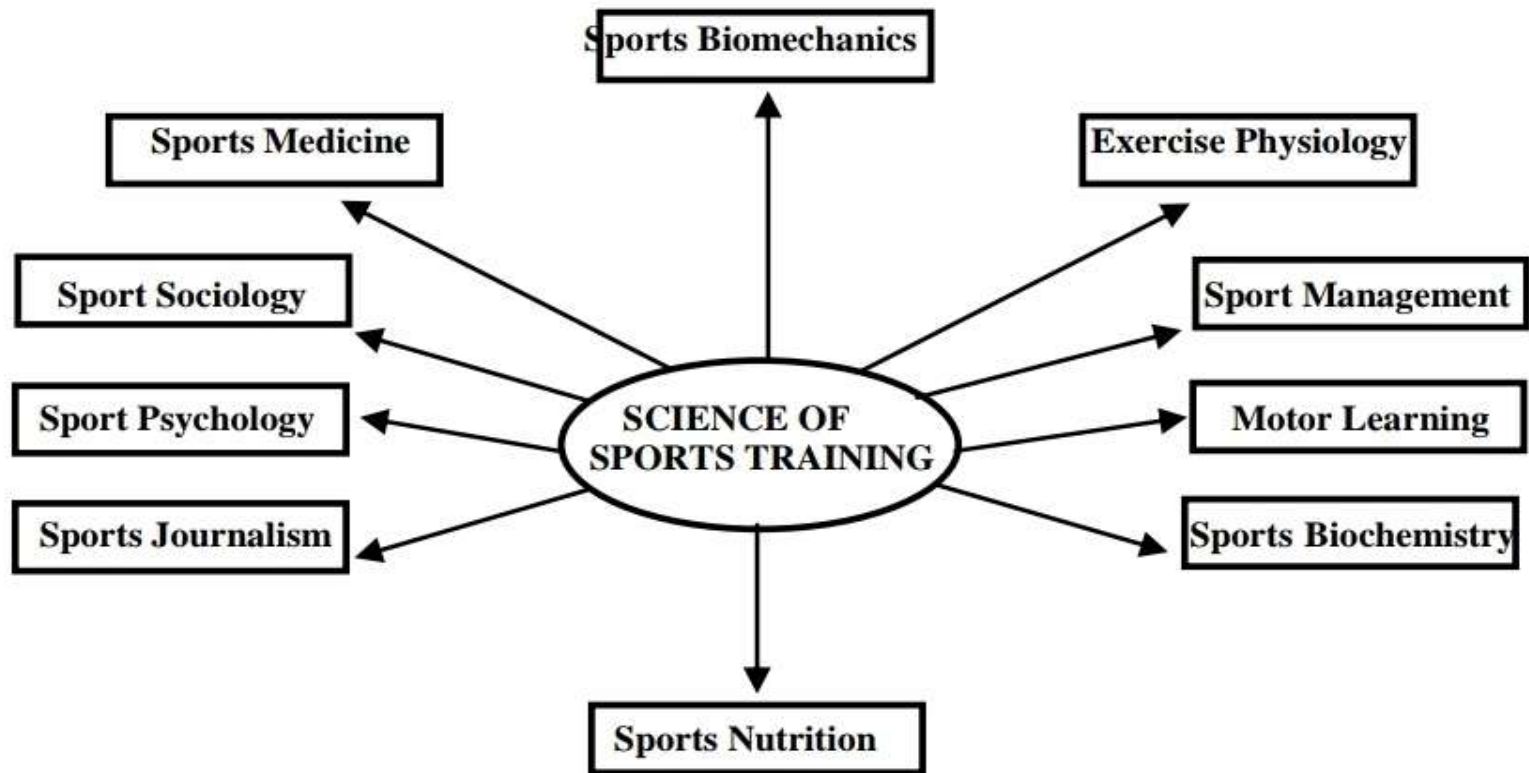
Sports Training - Sports training is a process of sports perfection directed by pedagogical and scientific principles aims at leading a sportsman to attain high- and top-level sports performance in sports by means of planned and systematic improvement of performance capacity and readiness of performance.

Training Methods



Relationship of science of sports training to other sports science disciplines

Relationship of science of sports training to other sports science disciplines

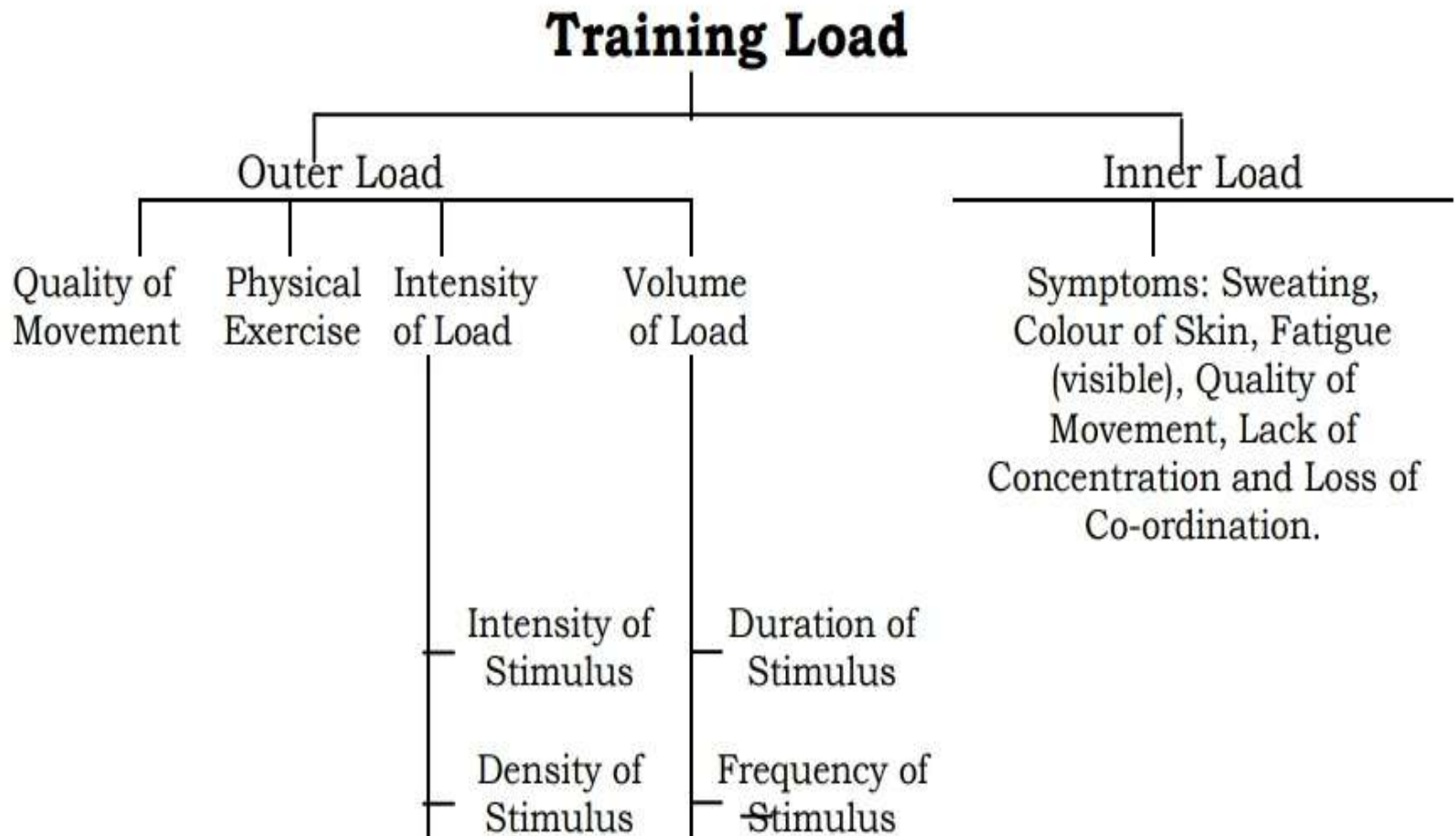


Principle of training load – most important why?

Reasons are -:

1. the principle of training load and administering recovery in proportion to that is the most important and any mistake in adhering to this principle will prevent the sportsperson from attaining high performance.
2. The training state of a sportsperson develops as a result of application of motor stimulus (movement) resulting in improvement of performance capacity.
3. In addition to improvement of performance, the training loads also facilitate maintenance and stabilization of performance capacity.
4. Sports training process involves activities and movements, which generally lead to fatigue.
5. Fatigue is essential for improving the performance capacity of a sportsperson. Training load therefore is of central importance in sports training.
6. Training load - Physiological and psychological demands placed on the individual through motor stimulus (movement) resulting in improvement and maintenance of performance capacity.

Factors of (Features) of Training Load



Components of Training Load and their Indices

Intensity of Stimulus	Density of Stimulus	Frequency of Stimulus	Duration of stimulus
<ol style="list-style-type: none"> 1. Intensity of motor stimulus e.g. speed, distance, height, magnitude of resistance (kg). 2. Frequency of movement. 3. Pace of a game. 4. Pace of a bout. 	<ol style="list-style-type: none"> 1. Expresses the relationship of the effective time of loading and the total duration of training unit 2. Ratio between phase of load and phase of recovery 	<ol style="list-style-type: none"> 1. Number of repetitions per set. 2. Number of sets. 3. Number of repetitions per training unit (all sets). 4. Number of loads for various muscle groups 	<ol style="list-style-type: none"> 1. Duration of effect of one stimulus 2. Duration of one set of stimuli (weight training) 3. Duration of one phase of load (expressed by the distance in case of cyclic exercise) 4. Duration of the training unit 5. Training hours per year.

Components of Training Load, Effect and Correlation

Outer load (Training Requirements)

Intensity of Stimulus	Density of Stimulus	Frequency of Stimulus	Duration of stimulus
<p>1. Influences the pace of development and the stability of adaptation</p> <p>2. When fixing the intensity of stimulus, take the following factors into consideration:</p> <ul style="list-style-type: none"> - Functional and morphologic adaptations - Technical level - Tactical skills - Psychological condition - Health and functional state 	<p>1. it is subordinate to intensity and duration of stimulus</p> <p>2. It is determined by the task of the training session</p> <p>3. Interval is longer in case the intensity stimulus is higher and the duration of stimulus is longer.</p> <p>4. Optimum density of stimulus guarantees efficiency of loading and prevents premature exhaustion</p>	<p>1. Depends upon intensity of stimulus</p> <p>2. Depends upon duration of stimulus</p> <p>3. In-case intensity and density of stimulus are higher, the frequency of stimulus is lower</p> <p>4. Frequency of training per week for:</p> <p>Beginner: 3-5</p> <p>Advanced: 6-8</p> <p>Top level: 9-12</p>	<p>1. Influences along with other components the effect of training on the sportsperson.</p>

Adaptation Process

CHANGES TO A NEW STATE



IMPROVEMENT OF CONDITIONAL ABILITIES



DISTURBANCE IN INTERNAL BODY BALANCE



RESTORATION OF HOMEOSTASIS CAUSING STRUCTURAL AND METABOLIC CHANGES



ENERGY LIBERATION PROCESS (DIFFERENT ENERGY SYSTEM)



CONTINUE EXERCISE DEPLETED ENERGY SUBSTANCE, ENZYMES, HORMONES



WEAR AND TEAR OF MUSCLE



– LEADS TO FATIGUE

- In literal sense the word adaptation means to get adjusted with. The human organism possesses the ability to get adjusted (adapted) to the environment and as the environmental conditions change
- This process of adaptation is also applicable to the field of sports training. The human organism changes to a new state of performance efficiency as a result of administration of external load. In fact load and adaptation go side by side.
- This process of adaptation is a bio-chemical process and is applicable to improvement of conditional abilities (strength, speed endurance) only.
- As the sportsperson is exposed to the training and competition demands, this results in disturbance of the homeostasis (internal body balance). The sportsperson makes an effort to restore the state of homeostasis by causing the different systems and bodily functions to adjust to the state of disturbance. In case the bodily homeostasis is disturbed again and again for a certain period of time than the human body responds by causing structural and metabolic changes, which enable the body to withstand the load more easily. This is called adaptation.
- In each training unit, the sportsperson performs different forms of physical exercises and these exercises put different demands on the sportsperson. For movement, energy is required which is released by the breakdown of energy substances. As the physical activity continues, the amount of energy substances decline. Enzymes and hormones are involved in the acceleration of energy liberation process and gradually get depleted. There is a wear and tear of muscle contractile substances and continuation of activity ultimately leads to fatigue.

SUPERCOMPENSATION

- ❑ During the recovery phase, all the substances, which were depleted, are restored. As a result of this, the performance level improves as compared to the preactivity level. This is termed as supercompensation.
- ❑ This state of supercompensation is a temporary process and lasts for some hours after which it disappears and reappears again after few hours with a diminished level. This level of performance lasts for some time and again disappears. It goes like a wave, which goes on diminishing until it finally vanishes. The first phase of supercompensation, when improvement is maximum needs to be consolidated and is the most favourable time for the next training load to be administered

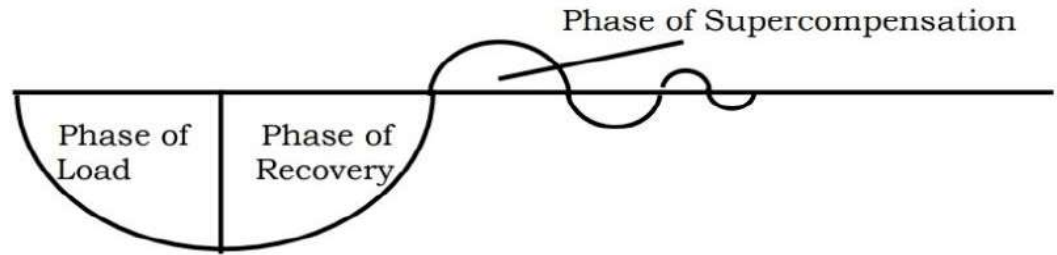
STANDARD LOAD AND CONDITIONS OF ADAPTATION

A training load, which has produced supercompensation effect, is termed as a standard load and a standard load cannot further improve the training state of the sportsperson. After the occurrence of supercompensation, the load should be increased during the next adaptation phase.

For adaptation to training load the following three conditions are to be fulfilled.

1. Training load has to be as per the loading capacity of sportsperson.
2. Recovery period should be in proportion to the training load.
3. Loading and recovery process is to be repeated for a certain period of time (10 to 20 days).

Effect of one training schedule on performance



Effect of regular training on performance

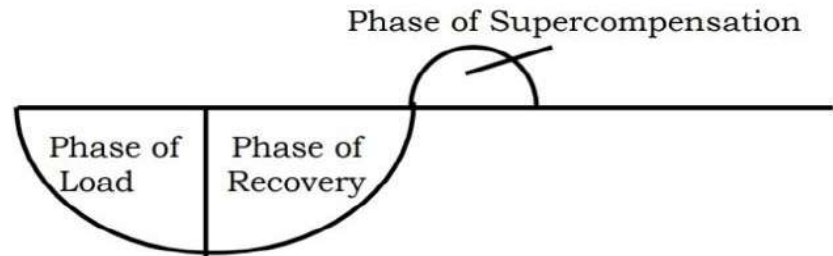
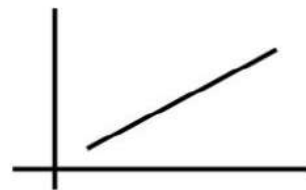
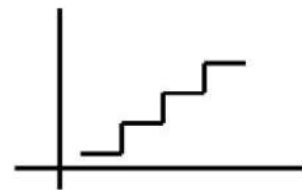


Fig. 3. Adaptation to training loads



Linear increase in load



Increasing load in the form of staircase

Fig.4. Procedure of increasing training load

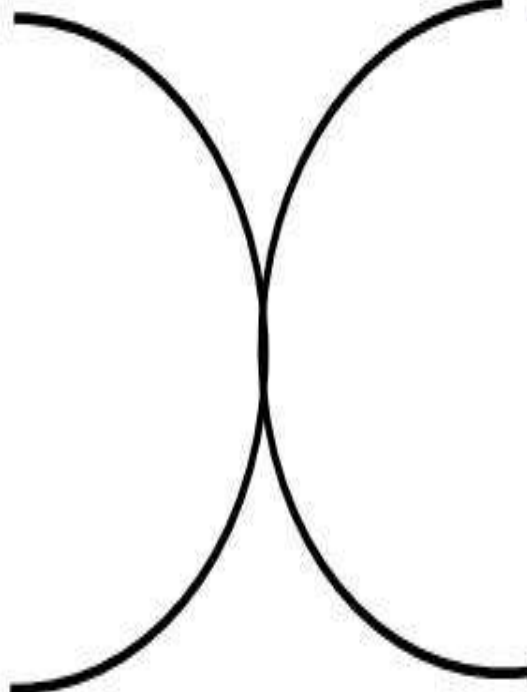
WITH VOLUME OF SUPPLY

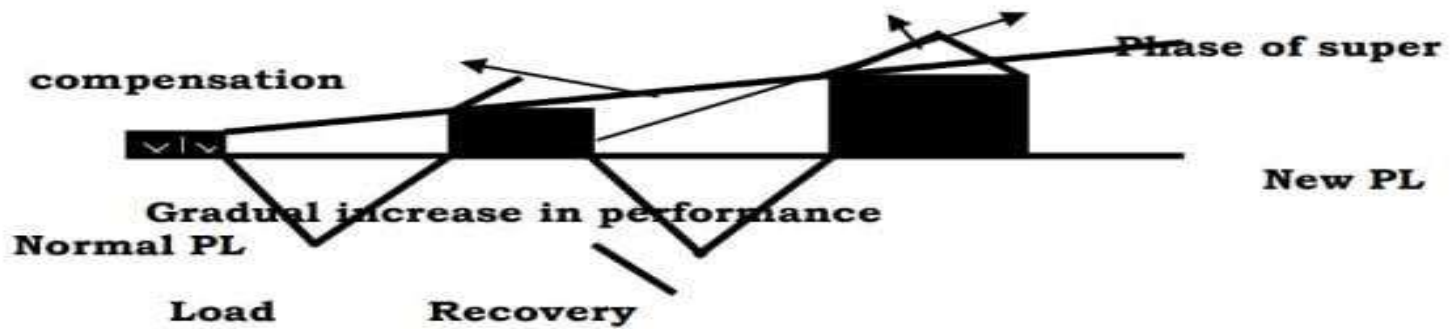
Intensity of Load

Volume of Load

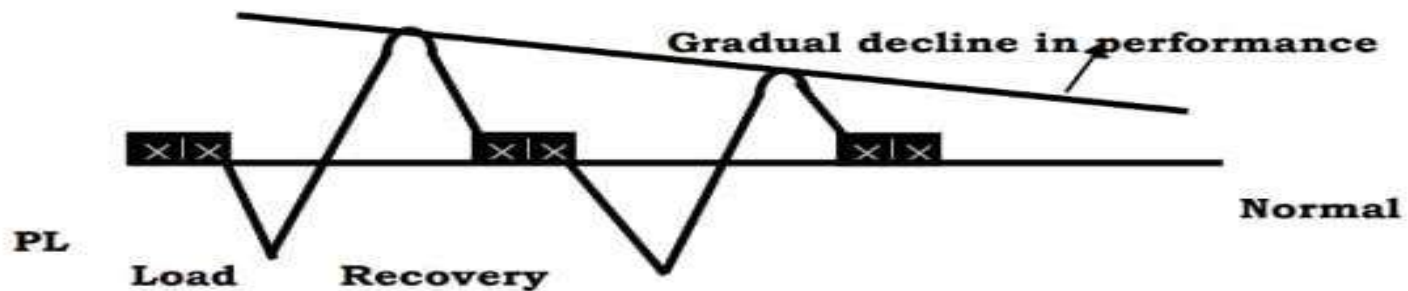
Volume of Load

Intensity of Load



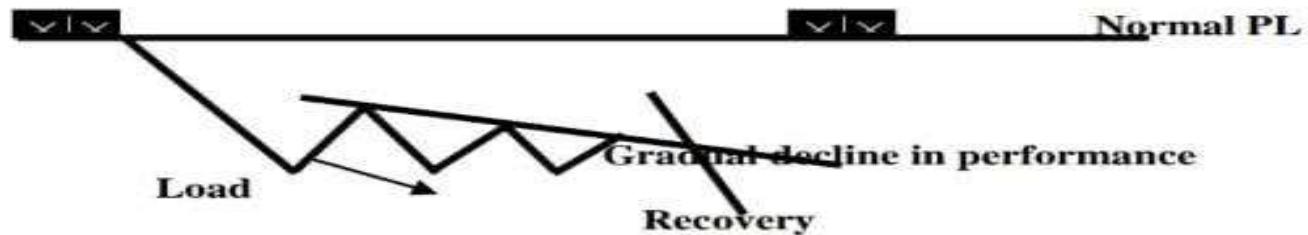


Proper relationship between phases of load and recovery

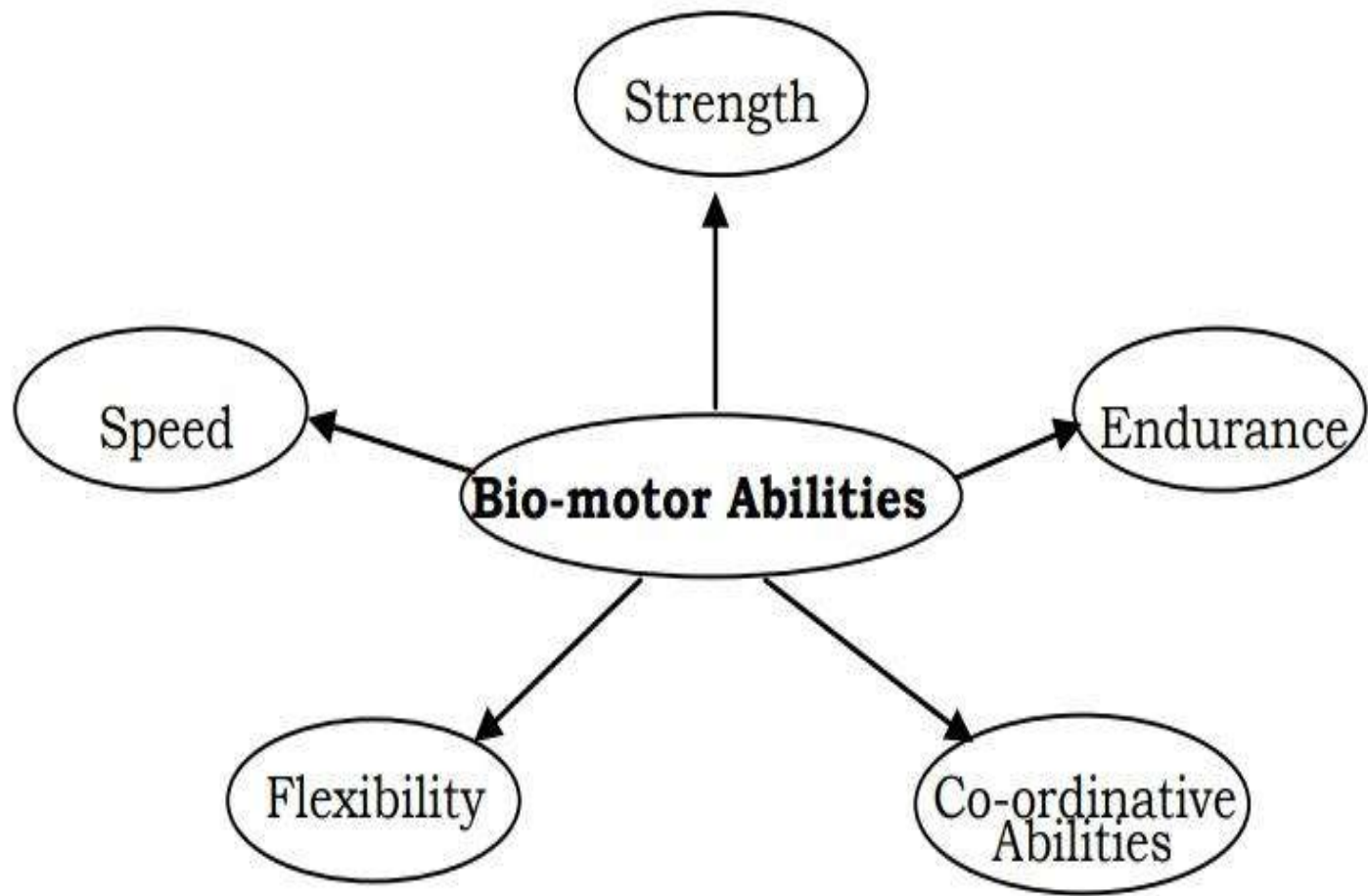


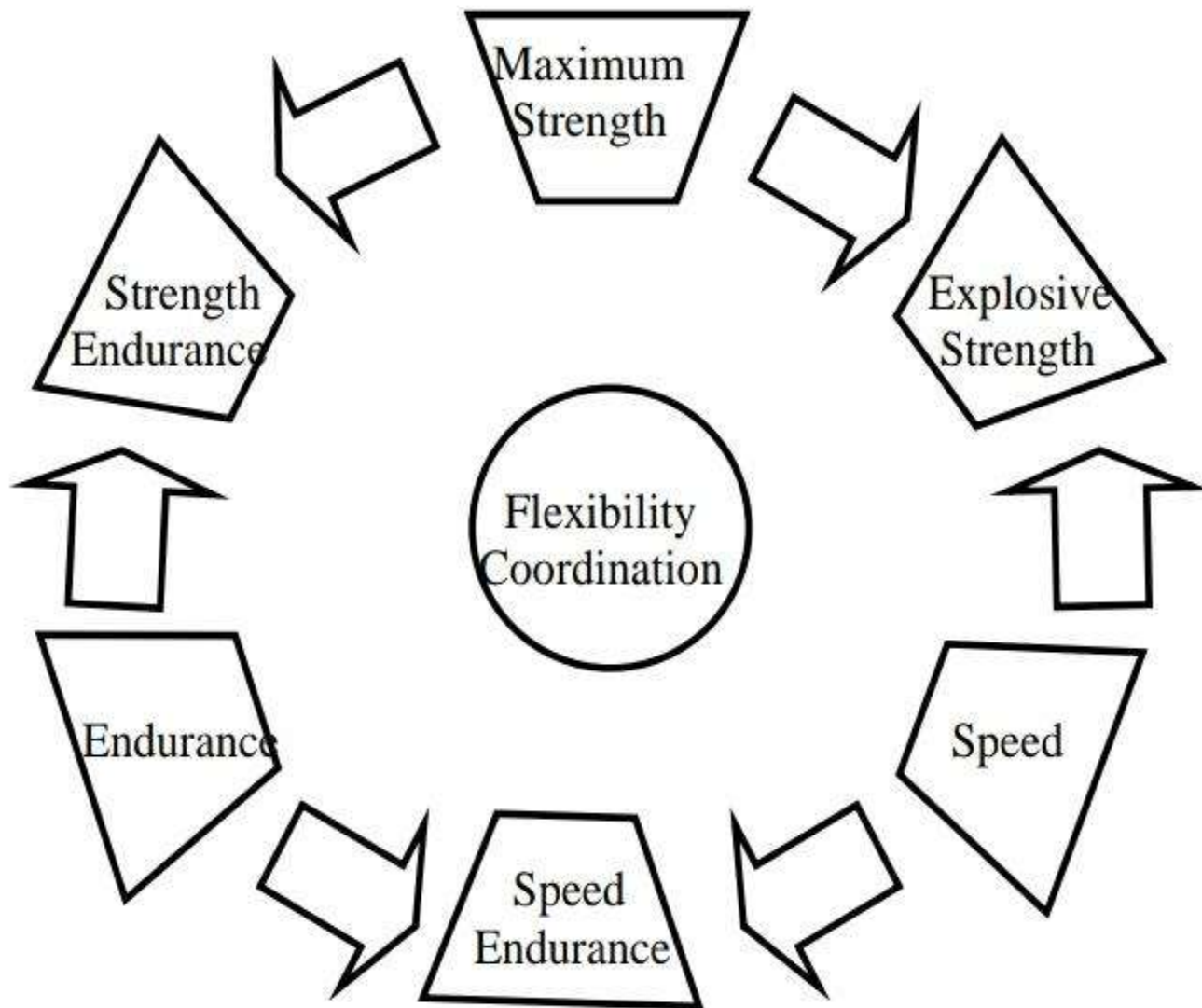
Improper relationship between load and recovery - longer recovery than required

Improper relationship between load and recovery - longer recovery than required



Improper relationship between load and recovery - very high load and short recovery





Inter-relationship of the biomotor abilities

STRENGTH

Strength - Strength is a conditional ability as well as the motor ability. It is conditional ability because it depends largely on the energy liberation processes of the muscle and it is motor ability because it is a direct production of muscular contractions. Strength is the ability to overcome or to act against basically four type of resistance

- 1) Resistance of implement
 - 2) Resistance of own body
 - 3) Resistance of opponent
 - 4) Frictional Resistance
-

TYPES OF STRENGTH

1. Maximum strength

2. Explosive strength

Starts strength

Strength speed (power)

Speed strength

3. Strength Endurance

Strength endurance

Endurance strength

Other forms of strength

Static strength

Dynamic strength

General strength

Special strength

Relative strength

STRENGTH : TRAINING METHODS

- The popular methods of strength training are:
 - i) Simple method of system
 - ii) Combination method or system
 - iii) Super set method or system
 - iv) Pyramid method or system
 - v) Plyometrics or reactive method
 - vi) Circuit Training

•

Circuit Training: Development of strength and conditioning

- “Great athletes are not born, they are made.” - Seb Coe
- Developed by
- **R.E. Morgan and G.T. Adamson** at the University of Leeds first developed circuit training in the 1950s.
- What is circuit training
- Circuit training is a method of fitness training that is designed to develop general, all-round physical and cardiovascular fitness.” - Scholich (1990:40)
- Used for purpose
- **It is very effective method of improving strength endurance. It** can be used to develop various aspects of strength and conditioning such as **muscular endurance , power, cardio-vascular endurance and anaerobic endurance.**

Why so popular?

- I. It is a versatile training method as it can be adapted for many
- II. different situations,
- III. different sections of the population
- IV. fitness requirements of the person
- V. it can be used at any time of the year.

Why so-called circuit

- Circuits should consist of between 6 and 15 stations
- exercises are normally laid out in a circular pattern, the pattern can be varied for motivational purposes to that of
 - a) a star,
 - b) square,
 - c) semi-circle,
 - d) V-shape,
 - e) line
 - f) zigzag
- requiring a total time of between 5 and 20 minutes to complete.
- Only 15 to 20 seconds rest should be allowed between stations.

CIRCUIT TRAINING DESIGN GUIDELINES

Muscular Endurance Circuit

- this type of circuit is typically used during the pre-season.
- Include exercises that cover the upper, middle and lower sections of the body.
- Include exercises that work the front and back of the body, i.e. opposing muscle groups, such as quadriceps and hamstrings.
- Lower-body ME activities need to include:
 - a) Forwards and backwards movement, e.g. lunge
 - b) Up and down movement, e.g. step-up Right and
 - c) left movement, e.g. side-lunge

Muscular Endurance Circuit Example

Exercises	Time on (s)	Time off (s)	No. of circuits
1. Press-up/modified press-up	30	15	2
2. Sit-up	30	15	2
3. Dumbbell squat & shoulder press	30	15	2
4. Bent-over row	30	15	2
5. Back extension	30	15	2
6. Multi-lunge	30	15	2

Cardiovascular Endurance Circuit

Like the ME circuit, a CVE circuit would tend to be used during the pre-season. It uses many of the movements that are typical of an aerobics session. The movements include dynamic actions using large muscle groups

- Include on-the-spot and off-the-spot exercises; an example of an on-the-spot exercise is knee-lifts and an off-the-spot exercise would be running shuttles.**
- Include high and low impact exercises**
- The exercises selected should be balanced as follows:**
 - a) Side to side movement**
 - b) Up and down movement**
 - c) Forwards and backwards movement.**
- Alternate between the different directions of movement.**
- Alternate between the high and low impact exercises.**
- Keep the athletes active during the time off (e.g. walking or stepping side to side)**

Exercises	Time on (s)	Time off (s)	No. of circuits
1. Jumping jacks	30	10	2
2. Shuttles	30	10	2
3. Knee lifts	30	10	2
4. Zig-zag running	30	10	2
5. Skipping	30	10	2
6. Grapevine	30	10	2
7. Step-up	30	10	2
8. V-step	30	10	2

Combined CVE and ME Circuit

in many cases, the goal of the circuit is to improve CVE and ME simultaneously. This aspect of fitness is generally targeted and developed during the pre-season,

- Include both ME and CVE exercises in the circuit; for equal emphasis, include the same number of CVE and ME exercises, to focus more on ME, have a greater percentage of ME exercises and vice versa.**
- Alternate between the CVE and ME exercises**
- For ME, use compound exercises as opposed to isolation exercises to target as many muscle groups as possible.**
- Compound exercises involve many joints moving and numerous muscle groups working simultaneously, e.g. back squat or step ups**
- 1. If CVE is the more important aspect of this circuit, consider avoiding floor-based ME exercises, such as sit-ups and back extensions during the circuit because the heart rate would decrease too much.**
- Instead, do these exercises at the end of the session**

Exercises	Time on (s)	Time off (s)	No. of circuits
1. Squat and shoulder press	30	10	2
2. V-step	30	10	2
3. Bent-over row	30	10	2
4. Jumping jacks	30	10	2
5. Lunge	30	10	2
6. Shuttles	30	10	2
7. Step-up and front raise	30	10	2
8. Knee lifts	30	10	2

Medicine Ball Power Circuit

Medicine balls are weighted balls that can be used to develop power. They range in size from 1 kg to 10 kg. With beginners it is recommended to use a lighter weight, such as a 3 kg medicine ball.

Medicine ball exercises can be included in a circuit by themselves or incorporated into a sport-specific or anaerobic circuit.

They are very useful for mimicking the skills and patterns of movement of a sport, such as the hand-pass in basketball or the rugby pass

An example of a medicine ball (MB) power circuit is as follows (three minutes recovery between circuits)

An example of a medicine ball (MB) power circuit is as follows (three minutes recovery between circuits):

Exercises	Repetitions	Time off (s)	No. of circuits
1. MB single-arm pass	6 each arm	30	2
2. MB twister	6 each side	30	2
3. MB kick	10	30	2
4. MB slam down	10	30	2
5. MB V sit-up	15	30	2
6. MB drive and push	6 each leg	30	2
7. MB overhead throw	10	30	2
8. MB knee lift	6 each leg	30	2

Anaerobic Circuit

The most appropriate time to use an anaerobic circuit is just before and during the competitive season.

An anaerobic circuit should only be used with athletes who have a good overall level of fitness and who participate in a sport with a high anaerobic demand.

The aim of such a circuit is to develop power, speed and anaerobic endurance.

It stimulates the body to develop the anaerobic energy systems through bouts of maximum-intensity, short-duration exercises

Exercises tend to be more plyometric and explosive in nature, e.g. squat jumps, and should involve the major muscle groups in the legs;

a plyometric exercise is a jumping type exercise designed to develop explosiveness and speed, e.g. hopping, squat jumping

The intensity level is high and the heart rate should be somewhere between 80% and 95% of the maximum heart rate.

The technical proficiency of the exercises and the speed of movement are vital;

Due to the high level of technical proficiency demanded during an anaerobic circuit, the time on is low and the time off is high.

The ratio of time off to time on is 2:1 or 3:1 depending on the anaerobic demands of the sport;

keep active during the time off by doing low impact on-the-spot aerobic exercises, e.g. sidestepping with hands on hips

Include exercises that work opposing muscles groups and alternate between upper, middle and lower parts of the body.

Include exercises that are relevant to the muscles used in the sport and the manner in which they are used in the sporting context

An example of an anaerobic circuit is as follows (four minutes recovery between circuits):

Exercises	Time on (s)	Time off (s)	No. of circuits
1. Pyramid sprints	15	30	2
2. Tuck jumps	15	30	2
3. Treadmills	15	30	2
4. Line ankle jumps	15	30	2
5. Burpees	15	30	2
6. Fast knees	15	30	2
7. Ankle jump pattern	15	30	2
8. Scissors jumps	15	30	2

Sport-specific Circuit To meet the specific requirements of a sport, it is advisable to design a circuit that is sport-specific.

1. the athlete is involved in, a circuit should be related to the

- age**
- training**
- fitness levels**
- Skills involved in the sport.**
- Fitness requirements of the sport**

1. Actions or movements involved in the sport, for example, jumping movements in basketball, getting up off the ground quickly in rugby.

2. Major muscle groups used in the patterns of movement involved in the sport.

3. Time of year, i.e. pre-season or competitive season

Exercises	Time on (s)	Time off (s)	No. of circuits
1. Squat jump to catch	30	15	2
2. Zig-zag running with soloing	30	15	2
3. Press-up	30	15	2
4. Shuttle running with soloing	30	15	2
5. Lunging with ball in front	30	15	2
6. Bent-over row	30	15	2
7. Split jump	30	15	2
8. Sit-up	30	15	2

INSTRUCTION AND DELIVERY OF A CIRCUIT TRAINING SESSION

safe environment guidelines

1. **Screening of athletes:** Screen athletes at the start of the session for illnesses and injuries. Include a warm-up at the start of the session and a cool-down at the end.
2. **Proper Ventilation:** Ensure that the room is properly ventilated.
3. **Safety of equipment's:** Check that the equipment is safe, e.g. collars tight on dumbbells.
4. **Exercises according to Fitness level:** Ensure that the exercises selected and the progressions are not only appropriate to the experience and fitness levels of the athletes but also safe.
5. **Check points of clothing:** Check the athletes' clothing; avoid wearing long tracksuits, heavy cotton clothing and jewellery, check to ensure that shoelaces are tied.
6. **Safety regarding surface:** Ensure that the floor surface is safe; if the surface is hard, use gym mats for any exercise where the body is in contact with the floor.
7. **First aid kit:** Know where the nearest First Aid kit is and who is qualified to provide first aid, if required.
8. **Monitoring:** Monitor the athletes throughout the session.
9. **Technique:** Ensure that the athletes' technique is correct at all times.

instructional guidelines related to circuit training.

Planning:

- Be prepared and plan in advance;
- have equipment and exercise station cards ready,
- have the circuit laid out in the appropriate pattern (circular, star, zigzag, square, etc.) before the start of the session.

Professionalism: Be professional with regard to

- appearance,
- punctuality,
- competency,
- organisation
- instruction

Manner:

- **Be enthusiastic,**
- **friendly,**
- **approachable,**
- **considerate,**
- **positive**

Voice:

- **Be clear and distinct;**
 - **project your voice,**
 - **especially over music,**
 - **vary pace and tone to emphasise important coaching or safety points**
-

Verbal instruction (coaching points):

- Coaching points should be meaningful,
- concise and direct;
- they should be specific to the movement and non-technical.

Visual instruction (demonstration):

- A demonstration of an exercise will increase learning.
- During a second demonstration, highlight important points that the athletes should adhere to, then conduct the demonstration and question the athletes on the points that you asked them to look out for.
- Allow immediate practice after the demonstration

Positioning

- Be in a situation where you can see everyone during the circuit training session;
- stay on the outside of the group and move around.

Observation: You need to observe the following during the circuit:

- **Technique of the exercises**
- **Athletes getting into difficulty**
- **Safety aspects. For example, have an athlete's shoe-laces opened?**

Monitor athletes:

- **it can be done by monitoring athletes' heart rates, breathing rates, appearance and exercise technique;**
- **you can simply ask them how they feel and/or use the rate of perceived exertion scale**

Feedback/correction of faults:

- **Provide feedback and encouragement throughout and at the end of the session**
- **Make sure you observe the athletes' technique when carrying out the exercises, and if a fault occurs, correct it**
- **Try to avoid just telling the athlete what the fault was. Give the correction rather than the fault**
- **Always try to be positive before giving this correction. This is known as constructive criticism**

REFERENCES

1. Brandon, L., & Berrangé J. (2010). *Anatomy: for strength and fitness training for speed and sport*. New Holland.
2. Dick, F. W. (2014). *Sports training principles*. Bloomsbury.
3. *Different Types of Training Methods For Athletes - The Sports School – Integrated School for Sports & Academics*. (2020, September 24).
4. *Different Types of Training Methods for Athletes - The Sports School – Integrated School for Sports & Academics*. (2020, September 24). The Sports School – Integrated School for Sports & Academics. <https://thesportsschool.com/types-of-training-methods-for-athletes/>
5. Griffin, B. (n.d.). *Your Guide to Basic Training Principles*. [Www.trainingpeaks.com](http://www.trainingpeaks.com). <https://www.trainingpeaks.com/blog/your-guide-to-basic-training-principles/>
6. La84 Foundation. (2008). *Track and field coaching manual*. Amateur Athletic Foundation of Los Angeles.
7. Multanimal Modi College. <https://mmcmodinagar.ac.in/econtent/physical-education-sports/different-types-of-training-in-sports-e-content.pdf>
8. Singh, H. (1984). *Sports training general theory & methods*. Patiala Netaji Subhas. Nat. Inst. Of Sports.
9. Strength, N. (2016). *Exercise technique manual for resistance training*. Human Kinetics.
10. Walden, M. (2019, July 6). *Training Methods & Types Of Training - TeachPE.com*. TeachPE.com. <https://www.teachpe.com/training-fitness/training-methods>
11. Wuest, D. A., & Bucher, C. A. (2003). *Foundations of physical education, exercise science, and sport*. McGraw-Hill College.
12. <http://bksp.portal.gov.bd>

THANK YOU