

Science And Technology Helps To Improve Sports Skill

Dr. Rajesh D. Chandrawanshi

Director of Physical Education & Sports

Shri R.L.T. College of Science, Akola Sant Gadge Baba Amravati University, Amravati

Introduction

There is worldwide progress in every area of human life. Struggle is the base of human life in modern era. The human body cannot function like a machine and it has its limitations. The performance of skill in any field and in activities of human body depends upon body structure, heredity, gender, age factors, weather, diet plan, guidance, training and coaching methods. Due to science and technology there have been tremendous changes in all areas of human life. Sports and Physical activities are the basic need of human body for fitness. Games and Sports are the most important factors for fitness with entertainment and also very much useful for leisure time. The field of games, sports and physical activity is very broad and involves a lot of physical activities and sports skill. Fitness is most important for performing higher level of sports skill. Speed, Stamina, Endurance, Flexibility, Muscular Power and Strength these concepts are included in fitness. Body mind coordination is a most important to achieve higher level of sports skill at the time of performance. Human body has limitations to perform sports skill in continuous higher level. Science and technology is very useful to analysis the lacuna in body movements and prepared latest sport's equipment to support sports skill performance.

Purpose

The purpose of this research is to know how science and technology helps to improve sports skills.

Science

Science is a most important stream for development in every field of human life. Scientific approach makes human life progressive, safe, lavish and full of facilities. The concept of science is very wide but generally Mathematics, Physics, Electronics, Computer, Information Technology, Microbiology, Bio-Chemistry and Medical Sciences etc. these subjects are included in science concept. In the field of sports science related some subjects i.e. Anatomy, Kinesiology, Bio mechanical aspects, Physiology and Test and measurements are included. Now a day's sports field requires more scientific based knowledge to improve sports activities level.

Mathematics

Mathematics is a common subjects which supportive every subject for record maintain. Mathematics includes the study of quantity, structure (algebra), space (geometry) and change (mathematical analysis). Mathematics is the science that deals with the logic of shape, quantity and arrangement. Mathematics is very much helpful in Sports field. In the field of sports activities mathematics helps to prepared skill based parameters, data record and data analysis. Without geometry helps the various sports arenas and the latest developments in the field of sports as well as analyzing sports skills is not possible. Algebra, Geometry and Mathematical Analysis is important, supportive and directive to achieve higher level of sports skills.

Physics

Physics related Measurement, Motion in One Dimension, Motion in Two Dimensions, Relative Motion, Newton's Law, Applications of Newton's Laws, Gravity, Work and Energy. Linear Momentum and Collisions, Rotational Dynamics & Properties of Matter these concepts are plays an important role in sports skill performance.

Electronics, Computer & Information Technology

The unique combination of Electronic, Computer & Information Technology these subjects are very helpful in development of modern technology based on sports skill performance. Sports skills performance related data collection with accurate electronics gadgets, perfect huge data timely storage with the help of computer, live records with the help of video, and scientific study on available data with live action with the help of computer software's. Information technology is important for storing, retrieving and sending information at worldwide level. Worldwide publicity of sports skill performance is height lighted through

information technology so the players, coaches or sports related personalities are motivated to achieve higher level of sports skills performance.

Medical Science

The concept of medical science is included Microbiology, Biochemistry, Medicine, Nutrition, Physiotherapy, Physiology, Human Anatomy, Kinesiology and Sports Medicines. Medical science related subjects are very much helpful to analysis the body condition, function of body organs, fluid level of various organs, deformities in body and body mind coordination of players at the time at the time of performing sports skills. Due to psychological and physically player unable to perform his skills performance at that time medical science is helpful to find out lacuna. Kinesiology is helpful for analysis muscle testing to imbalance in the body's structure, chemical and emotional energy. Microbiology, Biochemistry and Biochemical defines the three macromolecules which provide energy and structure to skeletal muscle - carbohydrates, lipids, and protein, its helps to improve sports skills performance. Medical Science related subjects are helpful to analyze real fact of body mind coordination so the player got correct reason for not performing his sports skills. As per the analysis of non performing reason the training program and skill development program is done by the coaches for the betterment of sports skills.

Sports Engineering

Sports engineering is a unique combination of art and science of designing, making and maintaining of different sports goods or grounds, sports infrastructure and sports skills based various sport's equipments. Sports engineering is very much helpful to prepared exact size of sports equipments required by players as per his body composition, weight and events. Thus type of sports equipments give safety from injury, player's can apply his full force with perfection and player feel comfortable to perform his higher level of sports skills performance.

Latest Equipments

Scientific and Technology based latest equipments give the correct information of player's body mind coordination with help of data collection and its analysis. The following equipments are helpful to supports, direction, current position of body and able to conduct a variety of coaching, training and scientific research studies to improve Sports Skill Performance.

Major Hardware: Exercise Equipment

- Treadmill (Track master) – High performance exercise ergometer.
- Exercise Bikes
- Electronically Braked Leg Cycle Ergometers
- Free Weights – Various resistance exercise equipment including a squat rack

Major Hardware: Physiology Measurements

- Metabolic Cart Spirometry and indirect calorimetric measures of oxygen consumption including VO₂
- Stress Testing Cart (GE Case Exercise Stress Testing Cart) –
- Air Displacement Plethysmography – Body density and body fat assessment.
- Hydrostatic Weighing Tank – Body density and body fat assessment.
- Bioelectrical Impedance Analysis – Weight, impedance, and body fat assessment.
- AD Instruments Data Acquisition Boards – Used with AD Instruments Lab Chart Pro software to collect real-time, continuous, and synchronized signals from a variety of analog and digital inputs from various research equipment.
- Single Lead ECG – Electrocardiogram for heart rhythms and heart rate.
- Strain-Gauge Pneumograph Respirace – Respiratory rate.
- Handgrip Force Transducer – Continuous handgrip force.
- Skin Thermistors – Continuous skin temperature.
- Rectal Temperature Probe – Continuous core temperature.
- Pulse Sensor – Basic heart rhythms and heart rate.

- Non-Invasive Blood Pressure System – Continuous finger blood pressure and cardiac output, stroke volume, and total peripheral resistance model flow estimates.
- Tonometer Probes – Pulse wave analysis and pulse wave velocity.
- Sphygmomanometer – Continuous digital occlusion cuff pressure.
- Metabolic Physiology System – Metabolic testing-oxygen consumption and VO₂
- External video capture – Video capture from external computer screens such as ultrasound machines.
- Ultrasound – Internal body structure visualization and blood flow assessment.
- Muscle Oxygen Near Infrared Spectrometer – Wireless muscle oxygen saturation assessment during rest, exercise, and blood flow occlusion.

Major Hardware: Movement Science Measurements

- Isokinetic Dynamometer – Muscle strength and power testing.
- 3D Motion Capture System (7 Camera Opti Track) – 3D human movement motion capture for Biomechanical and motor behavior analysis.
- Electromagnetic Motion Tracking System – 3D human movement motion capture without the need for ‘line of sight’ for the object being tracked.
- Force Platforms – Used in biomechanical analysis to measure forces applied on the ground and to calculate torques and forces at joints during walking, running and jumping.
- Virtual Reality System – An immersive method to provide and manipulate subjects’ field of view during research.
- Electromyography measurement system – Measuring the activation of muscles.
- Eye Tracking System– Assessment of eye movement and gaze fixation.

Major Software Programs

- Data Integration and Acquisition – Used with AD Instruments Power Lab hardware to collect a variety of analog and digital inputs from various research equipment.
- Exercise Trainer Software – Real-time visualization and recording of muscle oxygen and heart rate data.
- Cycle ergometer software suite – Real-time data acquisition of power and pedal rate for aerobic and anaerobic cycle ergometer exercise tests.
- Motion Monitor Software – A complete software solution for collecting and processing human movement data. Allows 3D kinematic and kinetic analysis. Integrates motion capture from the 7-camera OptiTrack system, Bertec Force plates and Ascension Electromagnetic Tracking System.
- MatLab and LabView – Custom software programming languages for engineering and life sciences.
- Graphing and Statistics (SPSS) – Professional quality graphing and statistics software.

Additional Equipment

- Heart Rate Monitors – Resting and exercising chest strap based heart rate assessment.
- Pulse Oximeter – Blood oxygen saturation stationary and portable.
- Automated Blood Pressure – Automated resting blood pressure and heart rate assessment.
- Manual Blood Pressure Equipment (Various) – Stethoscopes, stand based and portable blood pressure cuffs for the assessment of resting and exercising blood pressure.
- Windmill Spirometers – Forced vital capacity assessment.
- Skin fold Calipers (Lange and various other brands) – Measurement of skin and subcutaneous fat for body density and body fat assessment.
- Gullick Tapes (Various) – Measurement of circumference measurements.
- Stadiometer and Body Weight Scale – Calibrated height and mass measurement.
- Vertical Jump Trainer – Measurement of standing reach height and vertical jump.
- Handgrip Dynamometers (Various brands) – Static handgrip force.
- Aerobic steps – Aerobic step exercise and testing.

- Goniometers (Various) – Measuring joint angles.
- Mobile Privacy Screens – For separating the laboratory into more personalized spaces.
- Accelerometers) – Assessment of physical activity levels.
- Pedometers – Step count assessment.
- Metronomes – Pacing for various fitness tests.

Five latest technologies which have changed the sports world:

- **Hawk-Eye Technology.**
Hawk-Eye is used Cricket, Tennis, Gaelic Football, Badminton, Hurling, Tennis, Rugby, Football, Volleyball to visually track the trajectory of the ball display a profile of its statistically most likely path as a moving image with the help of computer system.
- **HANS's device.**
A HANS device is very useful for Head and Neck support to reduce the like hood of head and neck injuries such as basilar skull fracture the crash event.
- **Video Technology.**
Video technology is most important for live movements recording in various dimensions. It is also very useful for correct judgment at the time of sports skills performance. So the players may confirm about his sports skills performance and agreed to accept correct judgment.
- **Wearable Computers.**
A wearable computer is latest small technological devise. It is capable of storing and processing data related to your body movements. Wearable computers are worn on wrists and they are not only fitness trackers, they also includes wearable such as Heart pacemakers and other prosthetic.
- **Ingestible Thermometer Pills.**
A pill thermometer is an ingestible thermometer which allows core temperature to be continuously monitored of person. It was developed by NASA in collaboration with Johns Hopkins University for use with astronauts. The pill has been used by mountain climbers, football players, cyclists, F1 drivers.

Conclusion

On the basis of research study it is concluded that Science and Technology is useful to analysis the lacuna of body movements, to rectify the medical internal and external problems of body parts, performance base data analysis, correct judgment with help of latest equipments at the time of sports skills performance and to manufacture latest scientific equipments of various games and sports. Science and Technology is very much useful and helps to players for choosing perfect games and sports activity, sport's equipments, Sport's kit, training method, proper coaching, diet, medicine, to know level of fitness and how to perform higher level of sports skills.

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