Application of Biomechanics in Teaching Physical Education
Overview

- Define biomechanics
- Importance of biomechanics
- Applying biomechanics in teaching physical education
- Qualitative and quantitative approaches
- Biomechanics in teaching Judo
What is BIOMECHANICS?

*It is the application of mechanical principles in the study of living organisms* (Hall, 2007).
BIOMECHANICS

The study and analysis of human movement patterns in sports (Bartlett, 2007).
Importance of Biomechanics in Physical Education

- To help students improve their performance in sports, dance, and other physical activities.

- To reduce the risk of injury.
Importance of Biomechanics in Physical Education

- To understand the human body.

- To know how internal and external forces affect movement.
Importance of Biomechanics in Physical Education

- To improve techniques and equipment.
- To promote safety.
Importance of Biomechanics in Physical Education

- To improve teaching and learning processes.
- To cater students with special needs (Adapted P.E.).
PE teachers, coaches, and athletes are “biomechanists” but they think of biomechanics unconsciously.
Tasks of P.E. Teachers & Coaches

- Observe movement patterns of students or athletes during an execution of a skill.
- Correct errors and give feedback.
- Help students or athletes identify how a technique becomes effective.
Approaches

- Qualitative Approach
- Quantitative Approach
QUALITATIVE

- Observation of form and execution
- Mirrors
- Video Recording
- Performance checklist
GUIDELINES FOR TSUGI-ASHI AND TAI-SABAKI

Posture:
- Knees are kept slightly bent all throughout the whole routine.
- Hands are always held up in front of the body.
- Head is in a vertical position, eyes looking at the front.
- Upper body is kept upright and does not lean towards the front.
- Stance is always shoulder width apart.

Movement:
- Moves in a fluid and fast manner.
- Carries the body lightly but snappy.
- Follows curved pattern during forward and backward tsugi-ashi.
- Feet are apart and perpendicular from each other during diagonal tsugi-ashi.
- Feet are parallel to each other and are never brought together.
- During tai-sabaki, pivots on the ball of the feet and not on the heel.
- Maintains balance all the time.
- Balance is on the balls of the feet.
- Height, while knees are bent, is maintained throughout the whole routine.
- Slides on the mats and feet do not lose contact with the mats.

Others:
- Has mastery over the routine in terms of direction and flow.
- Able to count in Japanese while doing the whole routine.
- Focused and does not easily get lost when performing tsugi-ashi and tai-sabaki.
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QUANTITATIVE

- How fast did the student run? (Speed)
- What is the distance covered by the student after running 5 minutes?
- How high should a volleyball player jump to block the ball?
- How many free throws can a student do? (Angle of release)
When I teach Judo...

Physics of Judo
Concepts in Biomechanics

- Force
- Tension
- Gravity, Center of Mass
- Equilibrium
- Force Absorption
- Friction
- Newton’s Law
Teaching biomechanical concepts in physical education is easier than it seems, and it provides an ideal basis for collaboration with science teachers (Strohmeyer, 2004)
Knowledge of biomechanics in teaching physical education will help improve the performance of students.

It will also help the teachers in improving their teaching capabilities and efficacy.
Sound understanding of biomechanical concepts will help in the development of appropriate physical activities for students.

It will also help the teachers and coaches in understanding the movements of their students and athletes.
THANK YOU! 😊
References: