

## **Topic 6: Measurement and evaluation of human performance**

Content Area: **Science**

Course(s): **IB Sports, Exercise & Health Science**

Time Period: **3rd Marking Period**

Length: 5 weeks

### **Unit Overview**

**Statistical Analysis:** Students will learn to calculate and use standard deviation to analyze investigation or performance results.

**Study Design:** Student will learn how to safely conduct an investigation in exercise science.

**Components of Fitness:** Student will not only learn the various components of fitness, but factors that might affect them and how to measure them.

**Principles of Training Programme Design:** Students will learn the various components of training programs and how to design one based on goals.

### **STAGE 1- DESIRED RESULTS**

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## **2020 New Jersey Student Learning Standards- Science**

DCI: HS-LS1-2, HS-LS1-3, HS-LS1-6

CCC: Cause & Effect, Systems and System Models, Energy and Matter, Structure and Function, Stability and Change

S&EP: Asking questions/defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence, obtaining, evaluating & communicating information

### **Essential Questions**

How do we design a training program to optimize skill improvement? How do we know an athlete has improved?

### **Enduring Understanding**

Students will learn the various components of fitness and how to measure them. They will learn how to use statistics to analyze athletic performance while they learn how to design an investigation in fitness. This will all be applied to design an optimal training program.

### **Students will know...**

Vocabulary: error bar, variability, mean, standard deviation, coefficient of variation, t-test, correlation, causal relationship, normal distribution, variable, specificity, accuracy, reliability, validity, fitness testing, Physical Activity Readiness Questionnaire (PAR-Q), sub-maximal, maximal, health-related fitness, performance-related fitness, aerobic capacity, flexibility, endurance, agility, strength, speed, power, progression, overload, frequency, intensity, duration, specificity, reversibility, periodization, Karvonen method, Borg/OMNI/CERT scales, training heart rate, maximum heart rate, VO<sub>2</sub>max

### **Students will be able to...**

- 6.1.1 outline that error bars are a graphical representation of the variability of data
- 6.1.2 calculate the mean and standard deviation of a set of values
- 6.1.3 state that the statistic standard deviation is used to summarize the spread of values around the mean; with normal distribution approximately 68% and 95% of that values fall within +/- 1 or 2 standard deviations respectively
- 6.1.4 explain how the standard deviation is useful for comparing the means and the spread of data between two or more samples
- 6.1.5 outline the meaning of coefficient of variation
- 6.1.6 deduce the significance of the difference between two sets of data using calculated values for t and the appropriate tables
- 6.1.7 explain that the existence of a correlation does not establish that there is a causal relationship between two variables
- 6.2.1 outline the importance of specificity, accuracy, reliability and validity with regard to fitness testing
- 6.2.2 discuss the importance of study design in the context of the sports, exercise and health sciences
- 6.2.3 outline the importance of the Physical Activity Readiness Questionnaire (PAR-Q)
- 6.2.4 evaluate field, laboratory, sub-maximal and maximal tests of human performance
- 6.3.1 distinguish between the concepts of health-related fitness and performance-related (skill-related) fitness
- 6.3.2 outline the major components of health-related fitness and performance-related fitness
- 6.3.3 outline and evaluate a variety of fitness tests
- 6.4.1 describe the essential elements of a general training programme

- 6.4.2 discuss the key principles of training programme design
- 6.4.3 outline ways in which exercise intensity can be monitored

## **STAGE 2 - EVIDENCE OF LEARNING**

### **Formative Assessment:**

- 3- Minute Pause
- A-B-C Summaries
- Analogy Prompt
- Choral Response
- Debriefing
- Exit Card / Ticket
- Hand Signals
- Idea Spinner
- Index Card Summaries
- Inside-Outside Circle Discussion (Fishbowl)
- Journal Entry
- Misconception Check
- Observation
- One Minute Essay
- One Word Summary
- Portfolio Check
- Questions & Answers
- Quiz
- Self-Assessment
- Student Conference
- Think-Pair-Share
- Web or Concept Map

## **Authentic Assessments**

**Calculate** – the mean and standard deviation of sets of values

**Investigation** - finger length vs sporting ability (serves as practice IA for the class); analyze data, design investigation, complete background research

**Analyze** – data sets by comparing means and the spread of data between two or more samples

**Explain** - using an example, demonstrate that correlation does not establish a causal relationship between two variables

**Explain** – in a FlipGrid video to a potential participant in your research the importance of completing a PAR-Q

**Describe** – the benefits/detriments of field vs laboratory tests and the benefits/detriments of sub-maximal vs maximal test

**Research/Jigsaw** – importance of specificity, accuracy reliability, validity with regards to fitness testing

**Distinguish** – between health-related & performance-related fitness, finding examples of each

**Investigate** – variety of fitness tests in order to evaluate them in terms of validity, reliability and limitations of the following tests

**Outline** – the essential elements of a general training program, giving examples applying the key principles

**Calculate** – VO<sub>2</sub> max using the Harvard Step Test

**Calculate** – target heart rate using the Kavouran method

## Benchmark Assessments

- 6.1 Quiz
- 6.2 Quiz
- 6.3 Quiz
- 6.4 Quiz

UNIT 6 TEST (comprised of Paper 1 & Paper 2 type questions)

## STAGE 3- LEARNING PLAN

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### Instructional Map

Preview "I can" statements to identify learning objectives

Learn

Learn

Apply

Practice

Review "I can" statements to self-assess knowledge

## Modification/Differentiation of Instruction

### Differentiation Strategies for Special Education Students

- Remove unnecessary material, words, etc., that can distract from the content
- Use of off-grade level materials
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Time allowed
- Level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Varied homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.

- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Ability to work at their own pace
- Present ideas using auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment
- Differentiated checklists and rubrics, if available and appropriate

### Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-subject areas

### Differentiated Strategies for ELL Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials, including visuals
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge

- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Allow students to work at their own pace
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Role play
- Provide graphic organizers, highlighted materials
- Strategy and flexible groups based on formative assessment

### Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

### **504 Plans**

Students can qualify for 504 plans if they have physical or mental impairments that affect or limit any of their abilities to:

- walk, breathe, eat, or sleep
- communicate, see, hear, or speak
- read, concentrate, think, or learn
- stand, bend, lift, or work

Examples of accommodations in 504 plans include:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

Peer Tutoring

Repeated Drill and Practice

Cooperative Grouping

Teacher notes

Use of additional reference materials

## **Modification Strategies**

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- Cooperative Grouping
- Extended Time
- Frequent Breaks
- Highlighted Text
- Interactive Notebook
- Modified Test
- Oral Directions
- Peer Tutoring
- Preferential Seating
- Re-direct



- Repeated Drill and Practice
- Shortened Assignment
- Teacher Notes
- Tutorials
- Use of Additional Reference Materials
- Use of Audio Resources

## **Differentiation Strategies**

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### **High Preparation**

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- Alternative Assessments
- Choice Boards
- Games and Tournaments
- Group Investigations
- Guided Reading
- Independent Research / Project
- Interest Groups
- Learning Contracts
- Leveled Rubrics
- Literature Circles
- Multiple Intelligence Options
- Multiple Texts
- Personal Agendas
- Project Based Learning (PBL)
- Stations / Centers
- Think-Tac-Toe
- Tiered Activities / Assignments
- Varying Graphic Organizers

### **Low Preparation**

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- Choice of Book / Activity

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- Cubing Activities
  - Exploration by Interest (using interest inventories)
  - Flexible Grouping
  - Goal Setting With Student
  - Homework Options
  - Jigsaw
  - Mini Workshops to Re-teach or Extend Skills
  - Open-ended Activities
  - Think-Pair-Share by Readiness, Interest, or Learning Style
  - Use of Collaboration
  - Use of Reading Buddies
  - Varied Journal Prompts
  - Varied Product Choice
  - Varied Supplemental Materials
  - Work Alone / Together

## **Horizontal Integration- Interdisciplinary Connections**

See Appendix

## **Vertical Integration- Discipline Mapping**

9<sup>th</sup> grade – Biology  
 10<sup>th</sup> grade – Chemistry  
 11<sup>th</sup> grade – Anatomy & Physiology  
 12<sup>th</sup> grade – Physics

## **Additional Materials**

Sports, Exercise and Health Science by Oxford University Press (classroom set & PDF in Canvas)