**VO2 Max Spreadsheet Project**

ETEC 5303

**Name**:

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**Lesson Title**:

VO2 Max Spreadsheet Project

**Introduction**:

The purpose of this learning assignment is to satisfy the New Jersey Core Curriculum Content Standards [NJCCCS], specifically 2.6 – Fitness: *“All students will apply health-related and skill-related fitness concepts and skills to develop and maintain a healthy, active lifestyle.”* In addition for the student population of high school students, by Grade 12 students will be: *“Taking personal responsibility to develop and maintain physical activity levels provides opportunities for increased health, fitness, enjoyment, challenges, self-expression, and social interaction.”*; which includes substandard 2.6.12.A.2 that states *“Design, implement, and evaluate a fitness plan that reflects knowledge and application of fitness-training principles”*.

For this learning assignment we will be addressing two types of student populations, the endurance athlete and the non athlete. Both of whom will learn about what a VO2 Max Score is, why it is important to promote aerobic activities for a healthy lifestyle, the benefits of a having a healthy cardiovascular system, a way to chart progress in a training regimen. In addition they will learn to way to look at collected data and generate questions from their finding. Keep a detailed fitness log. Make comparisons from multiple physical fitness tests, and determine the accuracy of them.

*What is VO2 max?*

“VO2 max refers to the amount of oxygen that an individual can utilize during intense or maximal exercise. It is measured as “milliliters of oxygen used in one minute per kilogram of bodyweight”…”This measurement is generally considered the best indicator of an athlete’s cardiovascular fitness and aerobic endurance”…”The more oxygen you can use during high level exercise, the more ATP (energy) you can produce.

---Sportsmedicine.about.com

“VO2 max is an index of the body’s efficiency at producing work.”…”There are many factors that can influence VO2 max e.g. heredity, training, age, gender, body composition”…”VO2 max is the ‘gold standard’ measure of overall fitness”

---University of California, Davis Sports Medicine

*Why is this important?*

“Significant amounts of research and public health data indicate that low fitness are correlated with an increased risk of premature death from many causes but in particular from cardiovascular disease. Accordingly, higher aerobic fitness levels are associated with numerous health benefit… VO2 max the more potential for a successful performance in an aerobic endurance event”

---University of California, Davis Sports Medicine

“VO2 max decreases approximately five to 15 percent per decade after ages 25-30… Older adults can achieve the ten to thirty percent increase in VO2 max in response to endurance exercise training as young adults… Endurance training can help to maintain and improve various aspects of cardiovascular function as measured by VO2 max”

---American College of Sports Medicine, Dr. Robert Mazzeo

Endurance athletic competitions are growing by storm. They range from a level off variety from ‘tough mudders’, Spartan races, triathlons, duathlons, biathlons, etc. The endurance athlete needs to be in peak cardiovascular shape if one wants to be not only competitive but successful in these events. In theory a high VO2 max score determines that an athlete can have oxygen circulating through his/her body at a rate that would give them the competitive advantage over other athletes.

Non athletes should know their VO2 max scores because, a healthy heart generally means a healthier and longer life span compared to others. Students who are not classified as endurance athletes can find out similar results and determine whether or not they are in good health standards. Similarly they can draw conclusions from their endurance athlete counterparts, have a set of their own questions from the data sets provided.

**Grade or Age Level of Student(s)**:

The grade level of these students participating in this learning activity is any student at the high school level. It is my opinion that if this assignment is to be developed in the classroom it should be either as a freshman level or at the senior level. The freshmen level will provide a practice for students to follow throughout their duration at the high school level. While the senior level students on the other hand will provide a lifelong activity that they can take with them to help monitor their physical capabilities long after they leave their respected secondary level institutions.

**Objectives**:

Students should already have an understanding of collecting and monitoring data on a spreadsheet. Students will learn how to track fitness goals utilizing a spreadsheet [here the fitness goal will be obtaining a high VO2max score]. Students will learn about the concept of a VO2Max score, and the benefits of having a high score. Students will also learn what activities they can participate in that can develop their cardiovascular abilities. Students should be able to improve upon or maintain good cardiovascular health and a good VO2 max score

**Standards Addressed**:

As mentioned before this lesson addresses:

NJCCCS 2.6.12.A.2.

In addition it also addresses:

1. National Physical Education Standards
   1. Standard 2: The physically literate individual applies knowledge of concepts, principles, strategies and tactics related to movement and performance
   2. Standard 3: The physically literate individual demonstrates the knowledge and skills to achieve and maintain a health-enhancing level of physical activity and fitness.
2. International Society for Technology in Education (ISTE) Standard 3: Students apply digital tools to gather, evaluate, and use information.
   1. Plan strategies to guide inquiry
   2. Locate, organize, analyze, synthesize, and ethically use information from a variety of sources of media.
   3. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks
   4. Process data and report results

**Timeline**:

The data collection should be done over a month time frame. It is suggested that with the physical activities described in the project that the students participate in this lesson in the early fall or late spring so that they can have access to the track/outdoors and have comfortable weather. Many of these activities can be participated outside of the realm of the classroom if the student has access to the various exercise machines. That being said a student who is absent from class could easily make up a missing activity day by participating on an activity on the weekend or a study hall later on in the day if the student misses class.

**Materials:**

Computer/Tablet, stop watch, internet access to Mr. Palombo’s webpage, track [or set running course], Cardiovascular Fitness Calculations Chart, stationary bike, watt calculator for bike, Concept2 ergometer (rowing machine), Microsoft Excel/365, pen/pencil, paper, worksheets provided via Mr. Palombo’s webpage to download.

**Grouping Strategies:**

For the most part, this is an individual student assignment, as students will be participating in their physical activities independently and recording their own records. It is encouraged however, that students should pair up with another student in this process, as the there are many advantages (comparison, friendly competition, motivation, help train someone). Students will be complete the assignment individually and submit their materials to Mr. Palombo via email or hard copy.

**Learning Activities:**

Over the course of a month, students will learn about the following:

Day 1) What is VO2 max?

1. Introduction handout / links

See website:

<http://palomboz.wix.com/etec5303#!spreadsheet-assignment/zx38p>

1. Charts of VO2 max scores (see website)
2. Excel spreadsheet t to be downloaded (see website)
3. Description of physical and non physical activities that can be used in helping calculating VO2Max (see website)
4. Introduction to VO2 max portfolio assignment

Days 2 though 26)

1. Students will record their resting heart rate prior to any physical activity.
2. Students will record their VO2 Max Score from the non-physical activity.
3. Students will stretch, warm up
4. Students will engage in a physical activity of their choice to determine their VO2Max Results, [students may not repeat activity back to back]
5. Students will cool down, stretch, and hydrate.
6. Students will take data from their physical activity and enter it into the various calculating formulas on the excel spreadsheet.
7. Students will take the calculations from the spreadsheet and record data
8. Students will generate daily questions or observational statements about the data collected, students can also compare results with one another during this time period
9. Students will record resting heart rate 10 minutes after physical activity.
10. Students will submit their records/worksheets to Mr. Palombo at the conclusion of Day 26 [25 gym days]

Day 27 and 28)

1. Students will analyze data collected from the past month and draw conclusions
2. Make up time for any physical activities as a result from absences from class
3. Finalization of VO2 max assignment portfolio submission.

**Assessment:**

Students will be assessed on this assignment via a student portfolio that they will put together. The portfolio will be submitted electronically to Mr. Palombo by the deadline as determined by him. Students will have an introduction page that explains VO2 max, what their initial score was, how it correlates to their health, and what they may/may not need to do to improve upon. Students will participate in physical and nonphysical activities and catalog their progress in a spreadsheet that will be on Mr. Palombo’s website. During their data collection students will keep a journal of sorts to note questions/observations that they will turn in at the completion of the assignment. Finally, the students are going to be responsible to tie in their findings, and give a reflective/conclusion statement on the past month’s participation. The students will be scored on a rubric that is found below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 4 | 3 | 2 | 1 |
| Explanation of VO2 Max and how it correlates to the students health and specifically themselves | In their introduction sheet the student can clearly explain what VO2 max is, what factors contribute to the score, how to interpret their score results, and what is needed to maintain or improve their score | Student has three of the four items listed from Score 4 | Student has two of the four items listed from Score 4 | Student has one of the four items listed from Score 4 |
| Participation Rate in Physical Activity Assignments | Student participates in all daily physical activities (makes up for absent days), none activities are back-to-back, student displays legitimate effort and data in the physical activity record. | Student is missing one of the characteristics of Score 4, and has more than 75% of activities | Student makes moderate effort, but is missing less than 50% of activities | Student makes limited effort in participating in activities, 50% or more missing |
| Participation Rate in Non-Physical Activity Assignments | Student participates in all daily non physical activities (makes up for absent days), takes and records heart rate before and after activity, student displays legitimate data in the physical activity. | Student has less than 100% but more than 75% of items described in Score 4 | Student has less than 75% but more than 50% of items described in Score 4 | Student has less than 50% of items described in Score 4 |
| Spreadsheet  Daily Log | Spreadsheet is complete, well organized; student takes effort to help reader identify certain data sets (color code, key, etc.) student has chart/graph that coincides with their spreadsheet, daily log contains no errors. | Student is missing one aspect of Score 4 | Student is missing two aspects of Score 4 | Student is missing more than two aspects of Score 4 |
| Daily Questions  Observations | Student has unique questions and observations recorded for each day after physical activities | Student has a few repetitive questions, observations, or is missing a few daily questions or observations | Student has more than 3 repetitive questions, and is missing more than 3 daily questions or observations | Student has very limited or redundant questions observations |
| Student Reflection Statement | Student has a detailed reflective essay to conclude the assignment, essay is clear, with little or no errors, student ties in data into the reflection, student notes what could have been done differently for their own self, factors that contributed to the student’s results, and what the student can do to improve/maintain their VO2 max scores. | Student is missing one of the items described in Score 4 | Student is missing two of the items described in Score 4 | Student is missing more than two items in Score 4 |
| Punctuality | Assignment is turned in at the conclusion of the time frame of the lesson | Student is one day late. | Student is two days late. | Student is more than two days late. |

**References:**

University of California, Davis – Sports Medicine

<http://www.ucdmc.ucdavis.edu/sportsmedicine/resources/vo2description.html>

Equinox Cycling – VO2 max and watts

<http://furthermore.equinox.com/articles/2015/06/how-to-train-with-watts>

Concept2 Rowing – VO2 max calculator and FAQs

<http://www.concept2.com/indoor-rowers/training/calculators/vo2max-calculator>

Hunter Allen Training – VO2 max formulas

<http://www.hunterallenpowerblog.com/2013/06/how-to-calculate-your-own-vo2max_24.html>

Bijlmakers – Cooper Test and Charts

<http://bijlmakers.com/cooper-test/>

Running for Fitness – Cooper Test and Cooper Test Formula

<http://www.runningforfitness.org/faq/cooper>

Runner’s World Magazine (UK) forum – 5K VO2 max formula

<http://www.runnersworld.co.uk/forum/general-running/vo2-max-estimating-from-5k/113216.html>

Active.com – VO2 max training

<http://www.active.com/running/articles/how-to-maximize-your-vo2max-training>

University of North Iowa – Fitness Assessments (VO2 max activities)

<http://www.uni.edu/dolgener/Fitness_Assessment/CV_Fitness_Tests.pdf>

The Greater Rochester Track Club – Cooper Test and VO2 max

<http://www.grtconline.org/grtc-spring-track-clinics-and-workouts-2013-faux-menu-for-urls-1044>

Runner’s World – Who has the greatest VO2 max score of all time?

<http://www.runnersworld.com/sweat-science/who-has-the-greatest-vo2max-of-them-all>