STEAM &Sports

Lesson 15: Mathematics of Well-Being: Science, Health, and Active Life

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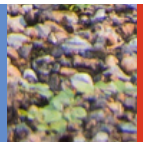

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Mathematics of Well-Being: Science, Health, and Active Life

Concept related to a sustainable development goal

SDG 3: Good Health and Well-being – Promoting healthy habits through the analysis of mathematical data, scientific understanding of the human body, and ethical reflection on well-being.

Integrated STEAM Areas
Mathematics: Biometric data analysis, proportions, and statistics applied to health.
Natural Sciences: Cardiovascular system, nutrition, and exercise effects on the body.
Ethics Education: Reflection on individual and social responsibility in promoting health.
Physical Education: Development of physical skills and performance improvement through data analysis.

Learning objectives and Outcomes

Upon completion of this lesson, students will know:

- Mathematics:
  - How to collect, interpret, and represent biometric data (BMI, heart rate, energy expenditure).
  - How to apply concepts of statistics, proportions, and percentages to assess health.
  - How to relate caloric intake to energy expenditure through mathematical calculations.
- Natural Sciences:
  - How the cardiovascular system functions and responds to exercise.
  - The relationship between nutrition, metabolism, and physical performance.
  - The importance of health prevention through physical activity and balanced nutrition.
- Physical Education:
  - How to assess and improve their physical condition using mathematical and scientific tools.
  - Fundamentals of biomechanics and healthy body posture.
- Ethics Education:
  - The connection between health and social inequality: access to resources and healthy lifestyles.
  - Personal and collective responsibility in promoting healthy habits.
  - How to critically analyze health-related information in the media and on social networks.

Students will be able to:

- Mathematics applied to health:
  - Measure, collect, and analyze biometric data using mathematical tools.
  - Apply statistics to evaluate the impact of exercise and nutrition on well-being.
  - Graphically represent the evolution of physical performance and draw conclusions.
- Natural Sciences in daily life:
  - Assess the effects of exercise on the body and propose improvement strategies.
  - Relate diet to metabolism and caloric expenditure.
  - Explain how to prevent health issues through healthy habits.
- Physical Education and personal performance:
  - Apply training routines based on scientific and mathematical data.
- Reflection and critical thinking in Ethics Education:
  - Analyze equity in access to health and well-being.
  - Argue the importance of physical activity in disease prevention.
  - Develop critical awareness of information related to health and sports.

Methodology

Teaching methodology.
The methodologies used in this lesson are as follows:

- Project-based learning: Students will design and analyze a healthy habits plan.
- Teamwork: Collaboration in data collection and decision-making.
- Use of technology: Applications to measure heart rate, BMI, caloric intake, and physical activity.
- Formative assessment: Observation, reflection, and data analysis presented in a final report.

Students will be arranged in teams of four, which facilitates the performance of physical activities in groups and also supports the development of other tasks, ensuring that all team members contribute equally.

Educational standards in connection with sports

Mathematics (Mathematical and STEM Competency)

- Statistical analysis: Interpretation of biometric data.
- Proportions and scales: Relationship between caloric intake and energy expenditure.
- Computational thinking: Use of digital tools for collecting health-related data.

Natural Sciences (Scientific and Ecological Awareness Competency)

- Functioning of the human body: Impact of exercise on the cardiovascular system.
- Nutrition and metabolism: Relationship between diet and physical performance.
- Preventive health: Risk factors and well-being strategies.

Ethics and Values Education (Personal, Social, and Learning to Learn Competency)

- Right to health: Reflection on equitable access to healthy habits.
- Individual and collective responsibility: Decisions about diet, exercise, and well-being.
- Critical thinking: Analysis of health information in the media.

Physical Education (Motor and Personal-Social Development Competency)

- Development of physical skills: Endurance, strength, speed, and flexibility.
- Body control and biomechanics: Posture analysis and movement efficiency.

Data-based physical performance: Use of mathematical tools to assess and improve performance

This lesson includes elements of these school subjects

Mathematics, Physical Education, Natural Sciences, and Ethics Education.

Timeframe

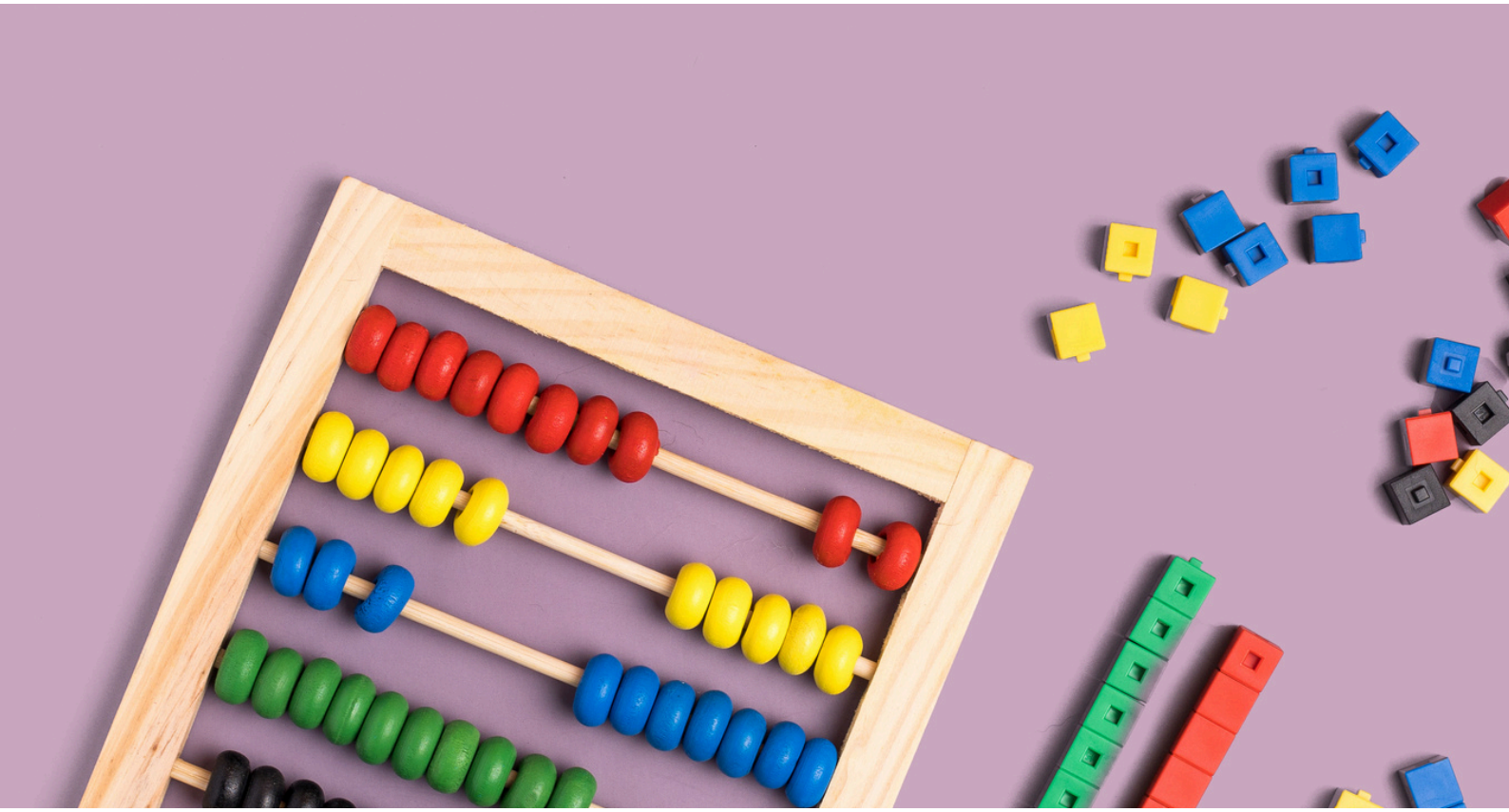
5 sessions of 50 minutes each.

Students Age

Should be between 10-15 years

Material needed

Digital tools: Physical activity tracking apps (Google Fit, smartwatches, nutrition apps).
Measuring instruments: Measuring tapes, scales, stopwatches.
Health resources: Scientific documents on wellness, nutritional guides.



Short description of the content

Students will measure and analyze biometric data (BMI, heart rate, energy expenditure), apply mathematical calculations, and reflect on equity in access to healthy habits. Through projects and debates, they will develop critical thinking and promote physical activity through a school awareness campaign.

Sequence of Lesson

Each session follows the 5E structure (Engage, Explore, Elaborate, Evaluate, Extend), promoting active learning and the development of cognitive, motor, and ethical skills.

Session 1 Introduction and Initial Reflection (50 min)
Objective: Connect students with the topic of health and well-being from an interdisciplinary perspective.

- Initial discussion:
  - Guiding question: What does it mean to be healthy?
  - Group reflection on healthy lifestyle habits and how they influence quality of life.
  - Ethical discussion: Do all people have the same access to health and well-being?
- Initial data analysis:
  - Presentation of real graphs and statistics about obesity, physical activity, and access to healthcare in Europe.
  - Introduction to the importance of data in health-related decision-making.

Session 2 Collection of Biometric Data and Scientific Analysis (50 min
Objective: Measure and analyze health-related data to understand its impact on well-being.

- Personal data measurement (with consent):
  - Calculation of Body Mass Index (BMI) (weight and height).
  - Measurement of resting heart rate and after brief physical activity.
  - Survey to record eating, sleeping, and exercise habits.
- Data recording and comparison:
  - Creation of tables with collected values.
  - Identification of patterns and relationships between physical activity and well-being.
- Daily Energy Expenditure (DEE) calculation:
  - Use of formulas to estimate basal metabolic rate.
  - Comparison of calorie intake vs. calories burned.
- Healthy Habits Plan:
  - Design of a balanced routine for diet and exercise.
  - Reflection on inequalities in access to a healthy lifestyle.

Session 3 Application and Critical Reflection (50 min)
Objective: Apply mathematical and scientific concepts to decision-making around healthy habits.

- Daily Energy Expenditure (DEE) calculation:
  - Use of formulas to estimate basal metabolism.
  - Comparison of calories consumed and burned based on physical activity.
  - Comparison with WHO recommendations.
- Design of a Healthy Habits Plan:
  - Based on the collected data, each group will create a proposal to improve diet and physical activity.
  - Consideration of ethical and social factors: How do socioeconomic and cultural contexts affect the ability to lead a healthy lifestyle?

Session 4 Presentation of Conclusions and Ethical Reflection (50 min)
Objective: Evaluate the impact of health-related decisions and their connection to social equity.

- Presentation of Healthy Habits Plans:
  - Each group presents their proposal, justifying their decisions with data.
  - Use of graphs and tables to visualize the impact of the proposed changes.
- Analysis of real-world cases:
  - Study of unequal access to health and nutrition.
  - Debate on individual and social responsibility in promoting well-being.

Session 5 Final Project and Community Action (50 min)

- Creation of a school campaign on healthy habits:
  - Infographics, videos, or exercise challenges.
- Organization of a sports day with performance tracking.
- Impact evaluation: Pre- and post-campaign survey

Lesson Developer

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Tips for age group differentation (for older/younger kids than indicated in the lesson)

Adapting the lesson for younger learners (8–10 years old):
To make the content more accessible for younger students, it's helpful to simplify the activities. For instance, you can focus on just one biometric variable such as heart rate instead of more complex data sets. Visual materials like pictograms, animated videos, or color-coded bar graphs are especially useful at this age. Replacing written surveys with drawing tasks or group conversations about healthy habits encourages participation and helps students connect personally to the topic. Physical activities should be playful and cooperative rather than performance-based.

Extending the lesson for older students (14–16 years old):
With older students, the lesson can be expanded to include a deeper analysis of the data they collect. They can work with spreadsheets, compare trends over time, and reflect on correlations between physical activity, nutrition, and well-being. Ethical discussions can also be more complex—addressing, for example, inequalities in healthcare access or misinformation in social media. Additionally, students can be challenged to design their own wellness initiatives or personalized training plans using the mathematical concepts covered in class.

To which SDG(s) does the lesson relate most

SDG 3 – Good Health and Well-being
This lesson is clearly aligned with promoting healthy lifestyles. Students not only learn about physical activity and nutrition, but also analyze their own well-being through data, fostering awareness and responsibility for their health.

SDG 10 – Reduced Inequalities
Through thoughtful reflection and classroom dialogue, students explore how access to healthcare, nutritious food, and fitness resources can vary widely. This promotes empathy and encourages inclusive thinking about health and society.

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What Inclusivity and Accessibility measures can or should the teacher take for this lesson

To ensure that all students feel safe, valued, and able to participate meaningfully, teachers can apply a range of inclusive strategies:

• **Physical adaptations:** If a student cannot perform certain physical activities, alternative roles can be offered, such as managing data collection or helping coordinate the group. Sample data can also be provided to ensure everyone engages with the analysis phase.
• **Support for diverse learners:** Use clear visuals, simplified language, and guided worksheets to support students with different learning needs or language backgrounds. Breaking down tasks into manageable steps helps build confidence and understanding.
• **Privacy and emotional well-being:** When dealing with personal data like weight or heart rate, make sure that sharing is optional and results are anonymized. Emphasize growth and learning over comparison or performance.
• **Cultural awareness:** Encourage students to reflect on how cultural traditions, family routines, and social environments influence lifestyle choices. Discussions around nutrition and health should be respectful of diverse perspectives.
• **Collaborative roles:** Give each student a role in group work that reflects their interests and strengths—such as presenter, note-taker, designer, or researcher—so that everyone contributes and feels included.
• **Technology access:** Make sure all students have the necessary tools to complete digital tasks. If this isn't possible, offer alternatives such as printed materials or allow students to work in pairs

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