Interactive Internet-based Learning in Science and Mathematics

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skool™ Globally Shared Interactive Lessons in Science and Mathematics

Teaching the Net Generation: Curriculum, Pedagogy and the Challenge of 21st Century Learning
Demonstration Agenda

• On Skooool.Ph Project
• Instructional Design Process
• Curricular Usability Alignment
• Learning Object Demonstration
The skool.ph Project

The project aligns for local use the science and mathematics interactive lessons and study notes available in www.skool.com, which is an e-learning initiative of Intel Education, and promoted locally by Intel Philippines World Ahead Program and Intel Teach, in partnership with the Department of Education.
The skool™ instructional content is presented in small, accessible, easily digestible learning chunks that aim to be fun, motivational and exploratory. The learning pace can be controlled by the learner and key points can be easily recapped.
The Skool™ Context

Skool™ is based on the interactive educational site originally designed for the Irish and later for the British education system to help secondary school students perform lesson review and prepare for their national curriculum certification exam. It is adapted by other countries and translated into some major languages.
The Skool™ Context

- skool covers over 250 multi-media resources in Mathematics, Physics, Chemistry and Biology
- Intel IP licenced to MOE or DepEd at zero cost
- Localized for country education system/environment
The local consultation workshops -with the curricular supervisors and teachers coming from the Department of Education and Philippine National Science High School evolves the instructional design process for an ICT enhanced teaching and learning.

It promotes a competency-based lesson alignment framework to facilitate the re-use of digital learning objects coming from other educational context.

Templates Available at: www.aralanetdesk.com
A local educational website is developed to contain the science and mathematics interactive lessons and study guides that were reviewed to support the learning objectives of the Philippines basic education competency standards.

The site is freely accessible and usable for both teacher-led and student self-directed learning scenarios.
Instructional Design Process

skool Enhanced Learning

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Usability Characteristics Review
skooool Enhanced Instruction

- Instructional Design
- Learning Content
- Use of Multimedia
- Learner Interface

*Download Usability Template:  www.aralanetdesk.com
Curricular Alignment Procedure
skoool Enhanced Lesson Planning

LEARNING OUTCOMES:
Specify the performance objectives in terms of what the students must be able to understand and be able to do, based on the prescribed learning competencies of the basic secondary education. (Specific and measurable)

LEARNING TOPICS:
List down the specific lesson to be understood or to be performed. Mark the lesson topics considered among the least mastered competency according to the results of the National Achievements Test.

skoool LEARNING OBJECTS:
Name the title of the skoool e-learning presentation, and classification of the e-learning object that realizes the stated learning outcomes of the topic. (e.g. Cell Functions - Simulation)

LESSON PLAN INTEGRATION:
Identify the possible placement of the skoool e-learning objects in the teacher's lesson plan. (motivation, review, concept presentation, activities, assignment, or assessment)
Competency-based Learning Objectives: Writing skool-enhanced learning objective

- **PERFORMANCE**: Describes what the learner is expected to know, and do or able to demonstrate

- **CONDITIONS**: Describes the ICT based circumstances under which the performance of the learner is expected to happen

- **CRITERION**: Describes the level of competence to be measured on the learner

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Sample Learning Objectives

**PERFORMANCE:** “A student will be able to calculate the atomic mass of a molecule.

**CONDITION:** “Given an interactive presentation of the detailed periodic table, a student will be able to calculate the atomic mass of a molecule.

**CRITERION:** “Given an understanding of the periodic table a student will be able to calculate the atomic weight of a molecule to 2 significant digits within .01 atomic units.”
They were only discovered in the last 100 years, mainly through the work of British scientist, William Ramsey.
Skoool™ Demonstration

• Curricular Map
• Multimedia Lessons
• Interactive Simulation
• Study Guide
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Mathematics Competencies

Elementary Algebra

The learner shall develop the following competencies: Measurements, Real Number System (integers, rational numbers, irrational numbers and real numbers), Algebraic Expressions, First Degree Equations and Inequalities in One Variable, Linear Equations in Two Variables, and Special Product and Factoring.

Intermediate Algebra

The learner shall develop the following competencies: System of Linear Equations and Inequalities, Quadratic Equations, Rational Algebraic Equations, Variations, Integral Exponents, Radical Expressions, and Searching for Patterns in Sequences, Arithmetic, Geometric and Others.
Mathematics Competencies

The learner shall develop the following competencies:
Geometry of shape and size, Geometric Relations, Triangle Congruence, Properties of Quadrilaterals, Similarities, Circles, and Plane Coordinate Geometry.

The learner shall develop the following competencies:
Functions, Linear Functions, Quadratic Functions, Polynomial Functions, and Exponential and Logarithmic Functions.
Mathematics Competencies

The learner shall develop the following competencies: Circular Functions, Angle Measures, Trigonometric Functions, and Fundamental Identities.

The learner shall develop the following competencies: Collection and Organization of Data, Sampling Techniques, Measure of Central Tendency and Variability.
Science Competencies

**Science II (Biology)**

Science II focuses on concepts and processes about the life of earth’s living creatures. It examines their anatomy and the inner workings of their parts and their interactions with other creatures. The course helps students appreciate how nature works, even those which are beyond the sight of the human eye.

The subject studies the major themes of cell structure and function, life energy, organ systems, reproduction, genetics, evolution, biodiversity, and the different ecosystems.
Science Competencies

Science III (Chemistry)

This Science is all about what makes up matter and its properties. The course not only feeds students facts about the composition of matter, but also enables them to discover these concepts through simulated experiments.

The course covers the different chemical compositions and properties of matter in general, solutions, colloids, and gases. It will also tackle the structure of the atom, scan through the properties of the elements, calculate the product of their interaction with and reaction to each other, and examine changes that occur in matter.
Science IV (Physics)

Senior Science is all about matter and its motion through time and space. Students are given fundamental physical laws that help them explain natural everyday phenomenon.

For the academic year, the course focuses on energy and its different themes. It tackles the properties and laws involving the atom, nuclear radiation, electricity, alternative forms of energy, electromagnetism, force, power, work, light, and sound. It also examines the scientific laws behind technologies from the simplest forms of tools to the fast-changing information and communications technology.
There are two sets of muscles that help you to breathe in and out - the intercostal muscles and the diaphragm.
Breathing

Q1. What happens to the muscles in the chest when you breathe out?

- A. The intercostal muscles contract and the diaphragm relaxes.
- B. The diaphragm and intercostal muscles both contract.
- C. The diaphragm and intercostal muscles both relax.
Lesson Multimedia Simulation

Breathing and Respiration

Sim Objective: Learn how the lungs are ventilated by breathing.
Click and drag each piece of the lungs to the patient's chest. Arrange the pieces in the correct order and click 'resuscitate' to wake the patient up.
Remember, placing the pieces in the wrong order has consequences!

Begin

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Lesson Multimedia Simulation

Breathing and Respiration

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Lesson Study Guide

Breathing System

The function of the breathing system is to take in oxygen from the air and get rid of carbon dioxide. This is called gas exchange. The diagram below shows the structure of the breathing system. The lungs are found in the upper part of the body called the thorax. They are protected by the ribcage and separated from the abdomen below by a sheet of muscle called the diaphragm.

Gas exchange occurs across the walls of the alveoli. They are adapted for this function in several ways:

- There are many of them, so they provide a very large surface area
- They have a moist surface, so oxygen can dissolve before diffusing into the blood
- They are surrounded by capillaries, so have a good blood supply to carry the gases

Oxygen diffuses into the blood from the air in the alveoli and attaches to red blood cells to be transported around the body.
Carbon dioxide diffuses out of the blood plasma into the air in the lungs to be breathed out.
Question & Answers

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