African Virtual University

Education: Biology BIO07

PEDAGOGICAL INTEGRATION
OF ICT IN BIOLOGY

Salomon Tchameni Ngamo

Foreward

The African Virtual University (AVU) is proud to participate in increasing access to education in African countries through the production of quality learning materials. We are also proud to contribute to global knowledge as our Open Educational Resources (OERs) are mostly accessed from outside the African continent. This module was prepared in collaboration with twenty one (21) African partner institutions which participated in the AVU Multinational Project I and II.

From 2005 to 2011, an ICT-integrated Teacher Education Program, funded by the African Development Bank, was developed and offered by 12 universities drawn from 10 countries which worked collaboratively to design, develop, and deliver their own Open Distance and e-Learning (ODeL) programs for teachers in Biology, Chemistry, Physics, Math, ICTs for teachers, and Teacher Education Professional Development. Four Bachelors of Education in mathematics and sciences were developed and peer-reviewed by African Subject Matter Experts (SMEs) from the participating institutions. A total of 73 modules were developed and translated to ensure availability in English, French and Portuguese making it a total of 219 modules. These modules have also been made available as Open Educational Resources (OER) on oer.avu.org, and have since then been accessed over 2 million times.

In 2012 a second phase of this project was launched to build on the existing teacher education modules, learning from the lessons of the existing teacher education program, reviewing the existing modules and creating new ones. This exercise was completed in 2017.

On behalf of the African Virtual University and our patron, our partner institutions, the African Development Bank, I invite you to use this module in your institution, for your own education, to share it as widely as possible, and to participate actively in the AVU communities of practice of your interest. We are committed to be on the frontline of developing and sharing open educational resources.

The African Virtual University (AVU) is a Pan African Intergovernmental Organization established by charter with the mandate of significantly increasing access to quality higher education and training through the innovative use of information communication technologies. A Charter, establishing the AVU as an Intergovernmental Organization, has been signed so far by nineteen (19) African Governments - Kenya, Senegal, Mauritania, Mali, Cote d'Ivoire, Tanzania, Mozambique, Democratic Republic of Congo, Benin, Ghana, Republic of Guinea, Burkina Faso, Niger, South Sudan, Sudan, The Gambia, Guinea-Bissau, Ethiopia and Cape Verde.

The following institutions participated in the teacher education program of the Multinational Project I: University of Nairobi – Kenya, Kyambogo University – Uganda, Open University of Tanzania, University of Zambia, University of Zimbabwe – Zimbabwe, Jimma University – Ethiopia, Amoud University - Somalia; Université Cheikh Anta Diop (UCAD)-Senegal, Université d' Antananarivo – Madagascar, Universidade Pedagogica – Mozambique, East African University - Somalia, and University of Hargeisa - Somalia

The following institutions participated in the teacher education program of the Multinational

Project II: University of Juba (UOJ) - South Sudan, University of The Gambia (UTG), University of Port Harcourt   (UNIPORT) – Nigeria, Open University of Sudan (OUS) – Sudan, University of Education Winneba (UEW) – Ghana, University of Cape Verde (UniCV) – Cape Verde, Institut des Sciences (IDS) – Burkina Faso, Ecole Normale Supérieure (ENSUP) - Mali, Université Abdou Moumouni (UAM) - Niger, Institut Supérieur Pédagogique de la Gombe (ISPG) – Democratic Republic of Congo and Escola Normal Superieur Tchicote – Guinea Bissau

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Production Credits

This second edition is the result of the revision of the first edition of this module. The informations provided below, at the exception of the name of the author of the first edition, refer to the second edition.

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ICT Integration in Biology

The process of integrating ICT in education is rarely a simple and linear one - overlaps are often noted, with some elements operating in parallel, in partnership and cyclically. The sequence of steps varies from one activity or situation to the next and must take context into account in order to be effective. The process is thus necessarily incremental and relies on clearly defined objectives to succeed in improving the efficiency of ICT use in education. This document presents major themes to assist educators in better integrating ICT with their teaching, and particularly allowing them to offer higher quality distance education programs to Mathematics, Biology, Chemistry and Physics students. An introduction to the theories and principles of ICT integration is presented within six themes, and further developed into seven specific learning objectives, which can be adapted according to the specific subject of the program.

Outline

The content of this module focuses on developing those teacher competencies and abilities common to all approaches to integrating ICT in learning, as teachers seek ways to improve their teaching. Examples of these general competencies include among others, ability to decide why, when, where, and how ICT tools will contribute to teaching objectives, how to choose from among a range of ICT tools those that are most appropriate to stimulate learning and improve the quality of education offered; ability to facilitate students' use and analysis of information from the Internet and ICT-based sources in relation to learning in specific subject areas. Thus, the process of integrating ICT in subject specific areas is of necessity incremental and relies on clearly defined objectives for its effectiveness in education. The integrated use of ICT in subject curricula and classroom teaching and management, is a complex process, which is usually achieved by following a set of guiding parameters. In this module, there are two complementary activities: the first focuses on the theories and principles that underpin ICT integration in education; and the second is teachers' computer-assisted practice in the use of ICT with support web-based portals. The module content provides a teacher training curriculum that incorporates the pedagogy, i.e. specific learning objectives and learning activities required to effectively integrate ICT into biology education. The principles are presented below, in the following form:

SECTION I: Conceptual framework

1.1 Required course materials

- 1.2 Module Rationale
- 1.3 General objectives, specific objectives
- 1.4 Learning activities
- 1.4.1 Pre-assessment
- 1.4.2 Key concepts
- 1.4.3 Required readings: references, summary and description
- 1.4.4 Multimedia resources

- 1.4.5 Useful links: address, title, screenshots, summary and description

SECTION II: ICT integration in specific disciplines

- 2.1 Crosscutting learning activities
- 2.1.1 Report on required readings + evaluation
- 2.1.2 Report on selected readings + evaluation
- 2.2 Biology specific learning activities
- 2.2.1 Activity one + evaluation
- 2.2.2 Activity two + evaluation
- 2.2.3 Activity three + evaluation
- 2.3 Module synthesis
- 2.4 Final evaluation
- 2.5 References

Prerequisites

- ICT Basic skills
- Access to a computer
- Access to internet (highly recommended)

Materials

The materials required to complete this course are:

- Computers
- CD-ROMS
- Software Simulation
- Animation

Course Goals

General Objective(s)

The module's general objective is to help student-teachers of Biology, to know how to use ICT as a tool for designing new learning environments for their own subject-specific purposes and to help their future students to use ICT. Exposure to this module is expected to provide the student-teacher with the knowledge, skills and attitudes to better use technology in their lesson-planning and lessons, research, communication, problem-solving, and continuing

professional development.

Specific Learning Objectives (Instructional Objectives)

The principles of ICT integration in education are expressed here as seven specific learning objectives for Biology. Students should be able to:

1. Critically apply the pedagogical principles of ICT integration in education.

2. Develop and facilitate ICT-based learning activities in the context of teaching biology.

3. Analyse and evaluate appropriate content and context for the use of ICT in biology teaching.

4. Use appropriate and varied communication and multimedia tools (emails, Websites, etc) in teaching and learning biology.

5. Use ICT efficiently in research, problem solving and project-based learning in biology.

6. Use ICT efficiently for professional development in the context of teaching and learning biology.

7. Use ICT efficiently for professional development in the context of teaching and learning biology.

Units

Unit 0: Module Overview

The unit contains reading materials and other resources that help prepare the learners about the module

Unit 1: ICT integration in all disciplines

[The unit presents some crosscutting learning activities for

integration of ICT in the science subjects, as well as specific

learning/ reading activities for biology.

Unit 2: Generic ICT tools and resources in biology

A wide range of tools and resources and introduced in this unit, for

use in our biology module; tools that can as well be used in other

disciplines

<u>Unit 3: Distinct ICT tools and resources in biology</u>

To successfully complete the EDU20 module we are required to

learn some specific tools and resources.

<u>Unit 4: Synthesis of the module</u>

The summary of the entire module is presented in this module

Assessment

Formative assessments, used to check learner progress, are included in each unit.

Summative assessments, such as final tests and assignments, are provided at the end of each module and cover knowledge and skills from the entire module.

Summative assessments are administered at the discretion of the institution offering the course. The suggested assessment plan is as follows

unit 0	Pre Assessment of ICT integration in Biology	15%
Unit 1	Assessment	20%
Unit 2	Assessment	30%
Unit 3	Assessment	35%

Schedule

Unit	Activities	Estimated time
Unit 0	This unit contains self-assessment questions and readings that will help you test your ability to complete this module and as well prepare you for the module	20
Unit 1	The activities of this unit provide the students the ability to have an understanding of ICT integration in other disciplines, which include biology, physics, mathematics, etc.	20

Unit 2	This unit provides the tools that can as well be used in ICT integration in Biology, the generic tools and readings that can aswell be used in other disciplines. A wide range of tools are introduced for the generic use in ICt particularly in Biology, such as inspirational software, thinkGraph.	25
Unit 3	The activities of this unit, which include the tools and reading materials are specific for the the module; which is ICT integration in Biology.	35
Unit 4	The summary of the module is contained in this unit. The summarizes the principles and theories of pedagogical integration of ICT and specifically for Biology.The evaluation of the course and the references that supported its development.	20

Readings and Other Resources

The readings and other resources in this course are:

<u>Compulsory reading #1</u>

<u>Complete reference</u>

UNESCO (2004). Technologies de l'information et de la communication en Education : Un programme d'enseignement et un cadre pour la formation continue des enseignants. Division de l'enseignement supérieur. ED/HED/TED/1.

http://unesdoc.unesco.org/images/0012/001295/129538f.pdf

Abstract: This book has two objectives: the first to delineate an ICT educational program for secondary school teaching that responds to current international trends. The second objective is to outline a professional development program and to support teachers in its implementation. In addition, it lends a practical and realistic approach to educational programs and teacher training, which allows efficient implementation with a given set of resources.

Rationale : This book is a UNESCO offering which aims to support educators and students in better integrating ICT, including multimedia, e learning and distance education, in the processes of training and knowledge sharing in the field of education. A particularly well-organized document, it offers examples of ICT applications in Mathematics, Biology, Physics and Chemistry teaching.

Compulsory Reading #2

Complete reference

Becta (2005). The Becta Review 2005 : Evidence on the progress of ICT in Education. Becta ICT Research.

http://dera.ioe.ac.uk/1428/

Abstract: This document is a scientific journal that surveys the impact of ICT in education. In particular, it notes the recent progress in classroom instruction. This journal also explores the inherent and current challenges of fully integrating ICT in education in a dynamic policy environment. In short, while demonstrating an increase in comfort with ICT amongst users, and that their use has increased significantly in the last two years, this document reveals that there is also real evidence of the positive impacts of ICT use in education.

Rationale: This document is a valuable resource which allows a better comprehension of the importance of ICT as a set of educational support tools, especially in Open and distance learning. The evidence clearly presented in this text suggests directions for the development of new content for e-learning programs.

Compulsory Reading #3

Complete reference

UNESCO (2004). School networkings: Lessons learned. Bangkok: UNESCO Bangkok (ICT lessons learned series, Volume II).

http://unesdoc.unesco.org/images/0013/001377/137741e.pdf

Abstract: This document is a collection of references for teaching with ICT. It presents a variety of methods to integrate ICT in teaching. The document, compiled by specialists, synthesizes a number of examples, and presents lessons learned on ICT use in schools in a variety of countries. These lessons could help improve the planning and integration of ICT in education. The text suggests tools to guide both policy makers and users in their advocacy, as well as to support ICT initiatives in education.

Rationale: This document is a reference for ICT use in teaching and learning in specific discipline such as Biology, Chemistry and Physics. Like other texts in the series it helps to better understand the process of integrating ICT in teaching the disciplines and in the use of technology to enhance learning.

Compulsory Reading # 4

Complete reference

Becta (2002). Impact CT2: The Impact of Information and Communication Technologies. ICT in Schools Research and Evaluation Series, No. 7, Department for education and skills.

http://webarchive.nationalarchives.gov.uk/20130401151715/

http://www.education.gov.uk/publications/eOrderingDownload/ICT%20and%20attainment.pdf

Abstract: This text is the next in a series of research reports produced by the UK organisation BECTA, on the educational impact of ICT. It addresses issues related to the use of ICT in disciplines such as math and science. It presents, in four stages, the relative gains of regular and occasional users of ICT in each discipline.

Rationale: It is important to read this document to better appreciate the benchmarks, and the real and potential impacts, for and of ICT use on learning in scientific disciplines. African teachers and learners faced with substantial challenges in their education systems can benefit from the experiences presented in this study to integrate ICT in their training practices.

Compulsory Reading # 5

Complete reference

UNESCO (2002). Teacher Education Guidelines: Using open and distance learning. Education sector, Higher Education Division, Teacher Education Section in cooperation with E-9 Initiative.

http://unesdoc.unesco.org/images/0012/001253/125396e.pdf

Abstract:

This document addresses decision-makers, teachers and students who are faced with the daily challenge of broadening educational programs through Open and Distance learning. Among other objectives, this document attempts to bring to light responses to fundamental questions in open and distance learning for teachers – What does this training consist of, what is the curriculum and who are the educators, is this training appropriate, who are the users, how should it be planned and organised, what technologies can be applied, how can it be financed, how can teachers develop competencies, how can they access these? These are the major questions broached in this important reference document for open and distance learning.

Rationale:

This document addresses the inherent challenges of teaching in Open and distance learning. As a resource the text provides suggestions for financing, planning organising and activities,

educational practices and evaluation. The document therefore presents useful information for collaborative work and further success in the field of Open and distance learning.

Compulsory Reading # 6

Complete reference

Tchameni Ngamo, S. (2006). Principes pédagogiques et Théories de l'intégration dans l'Education. AVU. Atelier de développement de Contenu pour formation d'enseignant. Nairobi - Kenya, 21st Août au 2 Septembre.

Abstract: This text presents the fundamental ideas, which mark the way for ICT integration in education. The theories herein centre around six poles, which together provide the elements essential for consideration in the process of bringing ICT to learning the sciences.

Rationale: A clear objective is only as useful as a clear path towards it- this principle certainly finds application in education – for, while targets may be well , the path towards them must also be marked. It thus seems appropriate to gain familiarity with the issues facilitating the integration and application ICT, so as to prepare and pilot learning activities and to manage teaching.

Unit 0. Pre-Assessment

Unit Introduction

The purpose of this unit is to determine your grasp of knowledge related to this course .

In this section, you will find self-evaluation questions that will help you test your preparedness and readiness to complete this module. You should assess your performance objectively after completion of the self-test, and carry out the recommended action based on your score. We encourage you to take your time in answering the questions.

Unit Objectives

Upon completion of this unit you should be able to:

A). General

- Familiar with the AVU Basic ICT Skills (using word processors, spreadsheet software, web navigator, etc. See list of pre-requisites).
- Confident in guiding AVU's ODeL trainee (lesson Plan- ning, reference links, etc.)
- Using software (interactive whiteboard software to create and save flip charts). (Annotation desktop mode, flip chart, paste in objects, load images.)

B) Using ICT in Numeracy

- Whole class teaching & group work Software e.g. Geogebra, Graph, ActivPrimary, Easiteach Maths, RM Maths, ICT in Maths, websites. Using RM Maths
- Using ICT in Literacy(Whole class teaching & group work)
- Software e.g. ActivPrimary Creating resource in generic software (e.g. TWAW, Talking First Word, My World3), websites.

C) Using ICT in Biology

- Using virtual labs and simulations (e.g. Optics Bench Applet http://webphysics. davidson.edu/physlet_resources/dav_optics/examples/optics_bench.html, Physics 2000)
- Using Biology modelling software (e.g. Crocodile clips). See http://www. crocodile-clips.com/science/
- Use of other ICT resources (e.g. Junior Insight & Sensing/ sensor equipment, digital camera, E-microscopes). Active Primary for whole class teaching

D) Using ICT in Science

- Using generic software to present information and for creating pupil resources in (e.g. TWAW, Talking First Word, My World, data handling programs), Datalogging Research using websites & CD ROMS,

E) Using ICT in other curriculum are

- Active Primary, creating resources in generic software (e.g. TWAW, Talking First Word, My World), websites, Micropedia CD ROM, other specific CD ROMs, digital camera, digital video camera..
- Using the shared areas on the AVU and/or PI site (Read, Write & Homework) to put templates and files for the pupils, to share work.
- Using Office software (Word, Excel, PowerPoint) for professional use e.g. to create and adapt teaching resources, write reports, plan out timetables, record pupil data.
- Use the Internet for professional development (teaching resources, teaching information, copying images)
- Use software to record pupil's progress
- Use of other ICT resources (e.g. scanner, digital camera)

Key Terms

ICT: Information (I) and Communication (C) Technologies (T) - the term ICT encompasses innovative audiovisual, computing and telecommunications techniques which allow the acquisition, processing and storage of information. Many of these techniques come directly from computing and communications. A number of acronyms are used, including IT, NT and IS. The term ICT is becoming more and more common in science, in Open and Distance Learning, and in Pedagogical Integration of ICT.

Pedagogical Integration of ICT: This concept is not limited to the establishment of networks and/or the installation of equipment. It includes the use of technology in schools to improve learning and to facilitate educational development. Among other definitions, this concept implies a process of appropriate, regular, and regulated use of interactive technology with incurred beneficial changes in school practices and student learning.

Software: These are programs initially conceived to facilitate consumer use of ICT. There are various types of programs used in the Pedagogical Integration of ICT including learning, open source and "free" software. A number of support mechanisms exist to assist teachers and students in becoming comfortable and efficient with ICT. This support is often presented in the form of CD-ROMs, tutorials, exercises or other didactic material.

Web Sites: These are a collection of files (HTML pages, images, PDF, audio, video, Flash-animations) and folders forming the structure of a site, placed together in computer memory (on a workstation during the development phase and a server when published), and linked together using hypertext. Access to a website can be global, using the World Wide Web, or limited to a local network. For any site to be accessible externally, web-server software must be operating on the server where the site is stored.

E-Learning: is a term used to refer to learning which takes place online. Self- directed learning plays an important role in this type of education, demanding an increased level of learner autonomy. E-learning programs can be completed remotely using the Internet, or can include short sessions of face-to-face teaching.

Synchronised communication: Refers to a mode of real-time communication, using tools such an Instant Messaging, chat rooms, discussion forums, conferencing systems and bulletin boards.

Non-synchronised communication: E-learning offers the option to de-synchronise educator and learner time, allowing them to communicate based on their own schedules, in a non-synchronised manner, through multimedia information exchange networks – for example using email or e-platforms to submit work.

E-portfolio: Also called a digital portfolio, this tool is unique in that it can manage about a dozen file types (text, images, audio, video, presentations, and hyperlinks). This new technology allows learners to subscribe to a portfolio, to organise their work, to be advised of updates, and to take tests and quizzes, in real-time. It is possible to communicate with the owner of a portfolio on edu- portfolio.org, either by email, or via the "comments" function. Overall this tool is flexible, simple and easy to use, allowing information and evaluations to be organised and exchanged. Its potential applications offer very attractive prospects to E-learning programs.

Internet: Connection to a very large number of computers using communication networks, such as telephone lines, to exchange information worldwide. The Internet is, however, distinct from the World Wide Web (www), which, like email, is only one of the principal services available through the Internet.

Intranet: This concept generally designates regulated connection between a group of authorised users. A password can be required for members to access and exchange information on these smaller networks (which use similar technology to the internet). Web sites, or web pages, are examples of networks that use Intranet. In E-learning Intranet networks are an efficient way of exchanging information between learners, educators, and peers.

Collaborative work: It is an activity in which learners perform all work using the tools of distance communication.

Puberty: is the stage of development in a man which translates the passage from childhood to adolescence, in other words of infertility to fertility. It is during this stage that there is development of secondary sexual characteristics in boys (hair, deeper voice, ejaculation ...) and in women (the appearance of breasts, menstruation, development of the hips ...).

Sexual cycles: it is a cyclical period of time that takes place entirely on physiological and anatomical changes in an individual. Cases of menstrual cycles in women are an example.

Hormone: Chemical substance produced by endocrine cells and acts through

the bloodstream to regulate the action of specific organs.

Educational outing: This is an educational activity that takes place outside the classroom and is designed to examine natural phenomena in situ.

Problem Solving: is an educational-based approach implementing evidence to solve a given problem and involves an individual or team-oriented effort

Simulation: The animated simulation of a natural phenomenon is a reproductive strategy of a complex phenomenon for scientific, recreational or training purposes.

Animation: setting a process in motion by assembling film still images consti- tuting the course of action.

Chat: a form of synchronous communication in writing using a computer and allowing participants to discuss a given topic

Forum: is a form of asynchronous communication in writing using the resources of a computer where each participant makes a contribution that will be read later by other members.

Food chain: The food chain can be understood as a set of living creatures linked together in a process of production and consumption of energy and matter in a given ecosystem.

Food Web: a nested set of food chains that connect the bodies of an ecosystem.

Ecosystem: This is the structural and functional unit of the biosphere, and is a group of biological communities coexisting in the same physical environment.

Modeling: makes any phenomenon graphically and visually comprehensible

Pre-Assessment of ICT Integration in Biology

Instructions

The Pre-assessment questions below are meant to guide the students to help them decide whether they have sufficient background knowledge and skills required for the completion of the content presented in this module. As the instructor you should encourage your learners to evaluate themselves by attempting all the questions provided below. It is strongly suggested that the individual student abides by the recommendations made on the basis of the mark obtained. Education research consistently shows that compliance with the recommendation will ultimately help learners to be better prepared for linking the new with their existing knowledge.

Grading Scheme

Evaluate your ICT competencies for this subject specific ICT integration exercise. If your score is equal to or greater than 60 out of 75, you are ready to use this module. If your score is between 40 and 60 you may need to revise your previous ICT basic skills course. A score less than 40 out of 75 indicates you need to do a basic ICT skills course. Try the following questions and evaluate where you are in the ICT user spectrum.Enter text here.

Unit Readings and Other Resources

The readings in this unit are to be found at the course-level section "Readings and Other Resources".

Useful Links

Learners

In this section, you will find links you will find useful in order to complete this module. You shouldn't consult them right away. Instead, we encourage you to briefly read over their descriptions and move on to the next section.

Instructors

The links placed here introduce learners to the resources available to them in order to complete this module. As their instructor you should encourage learners to read the descriptions provided before moving on to the learning activities. Education research shows that this will help learners be more prepared and help them articulate previous knowledge

Useful links # 1
Educ - Portfolio
www.eduportfolio.org
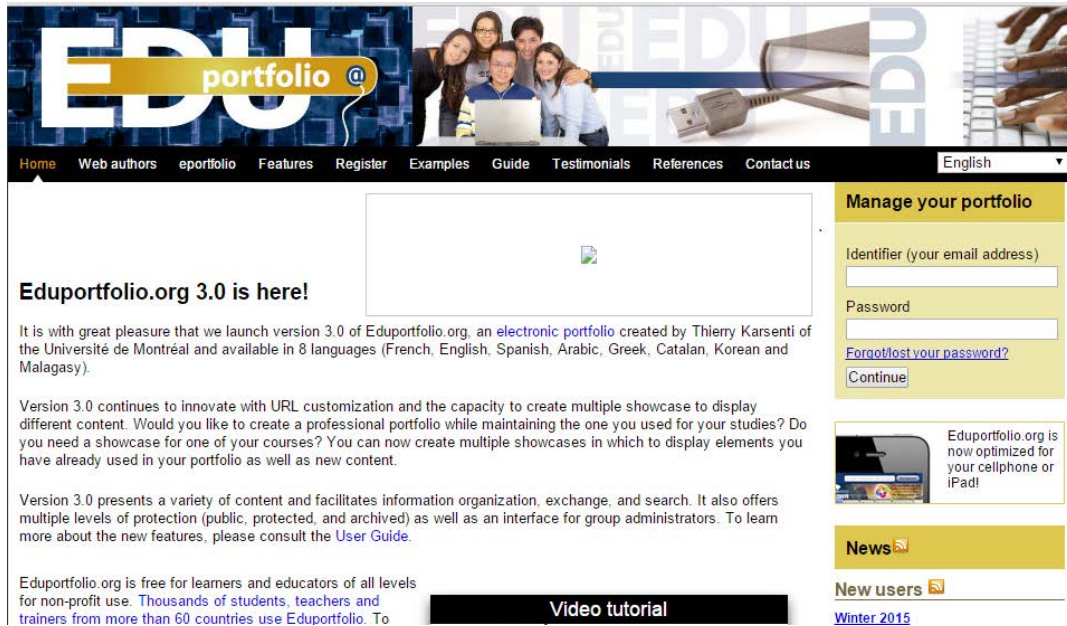
Description

Edu-portfolio is a website which presents, in a clear and straightforward manner, a virtual portfolio – a very important training tool in distance learning.

Rationale

A secure method for organising work is primary to success in an open and distance learning program. A portal through which to archive content, in addition to a discussion platform, makes for a dynamic educational environment.

Useful links # 2

ICT resources and guidance for teachers at all Key Stages

http://webarchive.nationalarchives.gov.uk/20110113101549/

http://www.teachernet.gov.uk/

Description

Practical help on using ICT in teaching is provided by TeacherNet.

Rationale

The application of technology in distance learning presupposes the availability of well-developed and reviewed content. Teachernet, to this end, assists educators in the complex and fascinating challenges of integrating technology with their teaching methods, by providing tools and pedagogical content.

Useful Links # 3

UneSco Bangkok: ICT Resources for Teachers CD-ROM

http://www.unescobkk.org/index.php?id=3871

Description

ICT Resources For Teachers CD-ROM contains a set of ICT-based resources for teaching and learning of science, mathematics, etc. for secondary-level students, including simulations, video clips, interactive learning objects for quizzes, animation, and other kinds of multimedia learning activities. The materials and lesson plans provided here are organized and relevant to subjects. A separate directory is provided to give an overall view of the types of resources available.

Rationale

In pedagogy the use of a variety of available resources stimulates learning. Appropriate audio-video support for learning activities which include diverse, information-rich, content, seems to hold learner's attention throughout the training process. Additionally, learning activities appear less monotone. This UNESCO website is worth a visit because it provides a collection of these resources for learning math and the sciences.

Useful links # 4

4Teachers: Home Page

http://www.4teachers.org/
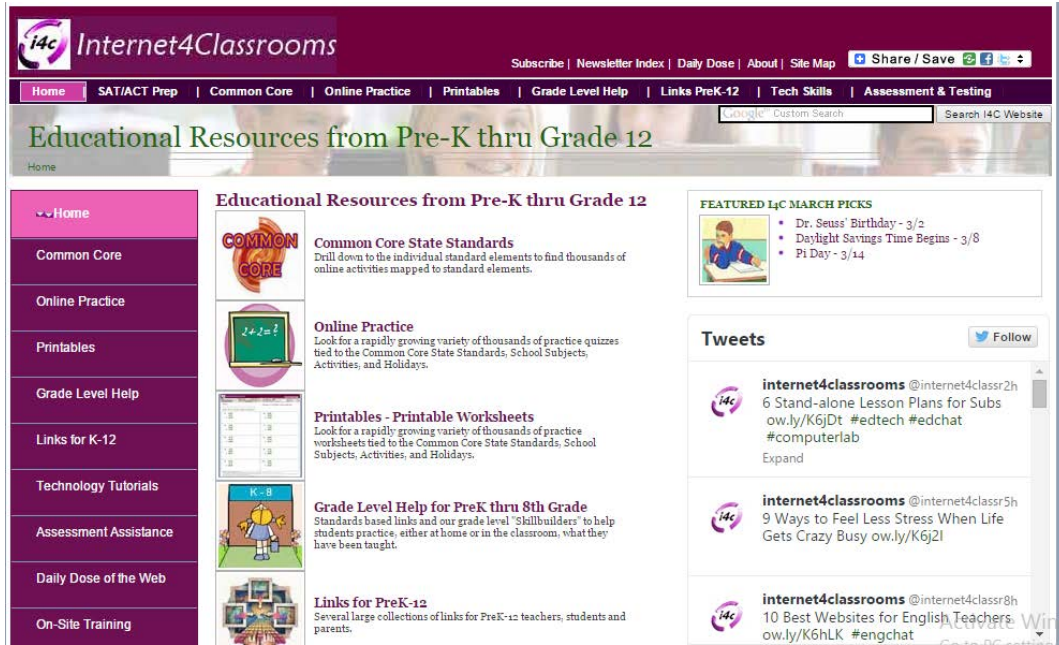
Description

4Teachers.org works to help you integrate technology into your classroom by offering FREE online tools and resources. This site helps teachers locate and create ready-to-use Web lessons, quizzes, rubrics and classroom calendars. There are also tools for student use. Discover valuable professional development resources addressing issues such as equity, technology planning and at-risk or special- needs students. Here you will find some of our resources to help you integrate technology into your curriculum, along with links to stories written by teachers who personally conquered integration challenges.

Rationale

Online learning is facilitated when available resources include a variety of multimedia resources and examples. As well, when these resources reflect real experiences of technology integration, they allow educators to discover new ideas and enhance their professional development.

Useful link # 5

Education World: The Educators Best Friend

http://www.education-world.com/
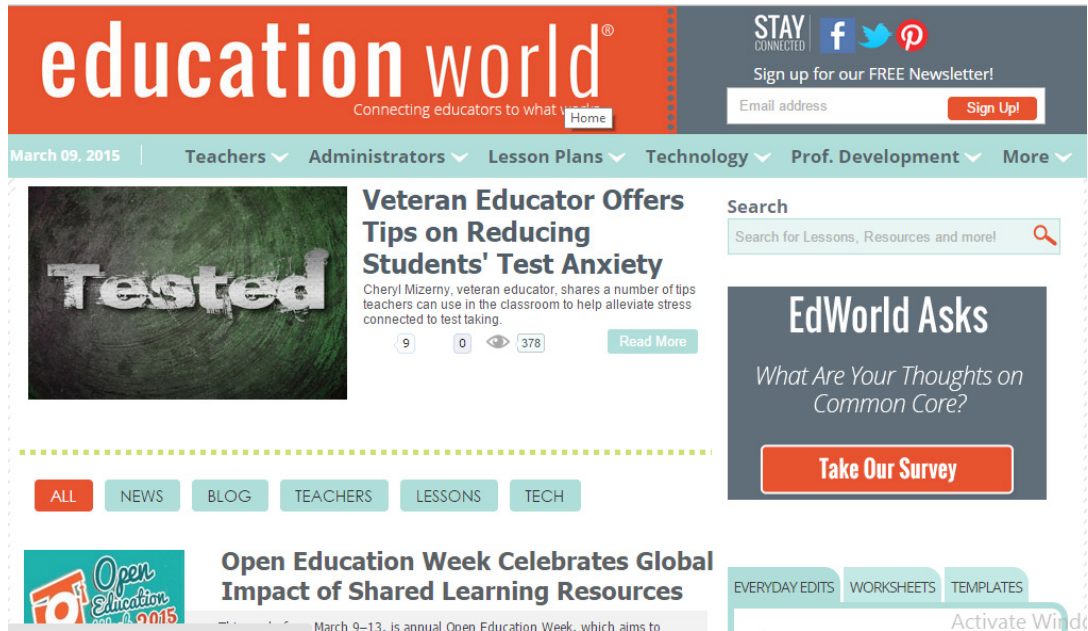
Description

The Website provides free featuring collaborative projects, virtual field trips, educational games, and other interactive activities.

Rationale

Problem-based and collaborative learning are standard pedagogical approaches in Open and distance learning. It is thus appropriate that learners and educators in the field visit this site, where projects and interesting interactive activities are available.

Useful links # 6

Resources to help students practice skills needed on state assessments

http://www.internet4classrooms.com/

Description

This Website provides resources to help students practice skills required on various assessments. Online Modules are available for elementary, Middle and high school students' assistance.

Rationale

The Internet holds an increasingly important place in schools. Because they are considered role models teachers must not fall behind their student's ability to use email and navigators. ICT use generally, and the Internet in particular, requires at least basic competencies. Internet4Classrooms provides a portal that reviews material to assist educators in effectively using the Internet.

Useful links # 7

http://www.unescobkk.org/index.php?id=1366

Description

This website includes a number of free, downloadable resources and provides substantial support for childhood education. Also available is free software for educators.

Rationale

Games play an important role in children's lives. They contribute, in large part, to motor and cognitive functions as well as accelerating the process of gaining social skills and knowledge. This UNESCO website is an easy-access source for a variety of interactive learning activities which supports different aspects of childhood development.

Useful links # 9

Unesco-Bangkok: ICT in Education

http://www.unescobkk.org/index.php?id=1366

Description

Five principal themes related to ICT integration policy are available on this UNESCO website. Teacher training, teaching, learning and monitoring are explored.

Rationale

Teacher training is only one, but perhaps the foremost, among the multiple preconditions necessary for the successful integration of ICT in education. In addition to reviewing information related to learning and teaching, this website also provides useful information on ICT integration policy.

Unit 1: ICT integration in all disciplines

Summary of the learning activity

This unit provides the ability for students to understand the integration of ICT in the disciplines such as, Biology, chemistry, physics, mathematics etc. The unit presents some crosscutting learning activities for integration of ICT in the science subjects, as well as specific learning/ reading activities for biology. In order to complete this module, students are given some compulsory readings and reports based on the readings.

Learning Activities: Crosscutting learning activities.

Unit Objectives

Upon completion of this unit you should be able to:

Understand concepts of the pedagogical integration of ICT in Mathematics, Biology, Physics and Chemistry teaching programs.

- Analyse the important themes developed in Journals and texts, noting the opportunities present in the integration ICT in your discipline or teaching practices.
- Explain the use of ICT by teachers in the context of Open and distance learning
- Analyse the challenges faced by teachers in Open and distance learning, as presented in the text
- Describe the theories and guiding principles of the pedagogical integration of ICT in education.
- Criticize texts on the integration of ICT in education.

Key Terms

Distance learning: Distance education or distance learning is a mode of delivering education and instruction, often on an individual basis, to students who are not physically present in a traditional setting such as a classroom. Distance learning provides "access to learning when the source of information and the learners are separated by time and distance, or both."

BECTA: Becta, originally known as the British Educational Communications and Technology

Agency, was a non-departmental public body funded by the Department for Education and its predecessor departments, in the United Kingdom. Becta was the lead agency in the United Kingdom for promotion and integration of information and communications technology (ICT) in education.

Command-line: A command-line interface (CLI), also known as command-line user interface, console user interface, and character user interface (CUI), is a means of interacting with a computer program where the user issues commands to the program in the form of successive lines of text (command lines).

Computer Workstation: A workstation is a special computer designed for technical or scientific applications. Intended primarily to be used by one person at a time, they are commonly connected to a local area network and run multi-user operating systems. The term workstation has also been used loosely to refer to everything from a mainframe computer terminal to a PC connected to a network.

Learning Activities

Activity #1 Crosscutting activities for all modules.

Introduction

Title of Learning Activity: Written report on compulsory reading. The readings for each activity are compulsory. Two texts accompany activities #1.1 and #1.4, and a single text for #1.2 and #1.3

Activity 1.1 - Reading Critique

UNESCO (2004). Technologies de l'information et de la communication en Education : Un programme d'enseignement et un cadre pour la formation continue des enseignants. Division de l'enseignement supérieur. ED/HED/ TED/1

- UNESCO (2004). School networkings : Lessons learned. Bangkok : UNESCO Bangkok (ICT lessons learned series, Volume II).

Introduction

Summary of learning activity

Read thoroughly the UNESCO (2004) text on continuing education for teachers, and the integration of ICT in scientific disciplines (lessons-learned and best practices for ICT in Mathematics, Biology, Physics and Chemistry teaching programs).

Activity Details

Suggestions for completing the assignment.

Read the UNESCO (2004) text and produce :

- A 3-page (maximum 1300 words, 1.5 line spacing) summary report. The report should clearly bring out the major points of a professional development plan that would allow teachers to succeed in integrating ICT in their discipline.
- A synthesis table presenting the basic skills necessary to apply ICT in pedagogical practices.
- An analysis of the important themes developed in the two texts, noting opportunities to integrate them in your discipline or teaching practices.

Assessment

Formative evaluation

 The evaluation of the learning activities is based on the quality of the learner's analyses, arguments, and examples, and the depth, richness and variety of their ideas. As well, the structure of the submitted work, how well it is organised, its style and language and presentation, are important. In line with these expectations, the evaluation of this activity will be weighted as following:

- Summary report (40%)
- Synthesis table of basic ICT skills (30%)
- Analysis and opportunities for integration (30%)

Activity 1.2 - Creation of a trainer profile in distance learning.

UNESCO (2002). Teacher Education Guidelines : Using open and distance learning.

Education sector, Higher Education Division, Teacher Education Section in cooperation with E-9 Initiative.

 Introduction

 Fundamentals concerning the use of ICT by teachers in the context of Open and distance learning.

Activity Details

Having read the UNESCO (2004) text (reference below?):

- Write a brief critique (600 words, or two pages at 1.5 line spacing) responding to the major challenges faced by teachers in Open and distance learning, as presented in the text.

- Illustrate, in a table, the competencies required of, and the ideal profile for, an Open and distance learning educator.

Assessment

The evaluation of this activity will focus on both content and presentation. 60% will be dedicated to the quality of the analysis, and 40% to its presentation, particularly the competency table.

Activity 1.3 - Reading critique.

Tchameni Ngamo S. (2006). Pedagogical Principles and Theories of integration of ICT in Education. AVU Teacher Education Authoring content Workshop. Nairobi - Kenya, 21st August to 2nd September

Introduction

Fundamentals concerning the use of ICT by teachers in the context of Open and distance learning.

Activity Details

Read thoroughly the text on the fundamentals of ICT integration in education, and write a report that briefly (in two pages, 1.5 line spacing) presents the important aspects of ICT integration, as outlined in the document.

In an additional section, critique the text, and relate its themes to professional development for educators.

Assessment

Formative evaluation

The evaluation of the learning activities is based on the quality of the learner's analyses, arguments, and examples, and the depth, richness and variety of their ideas. As well, the structure of the submitted work, how well it is organised, its style and language and presentation, are important. In line with these expectations, the evaluation of this activity will be weighted as following:

- Report on the reading (50%)
- Critical analysis and link to professional development (50%)

Activity 1.4 - ICT impact "success stories".

Reference for the reading

- Becta (2005). The Becta Review 2005 : Evidence on the progress of ICT in

Education. Becta ICT Research

- Becta (2002). Impact CT2 : The Impact of Information and Communication Technologies. ICT in Schools Research and Evaluation Series - No. 7, Department for education and skills.

Introduction

Various positive impacts of ICT use in mathematics and science.

Activity Details

- Begin by reading the two Becta (2005) texts on the evidence of positive impacts of ICT on learning, then:
- Write a one-page synthesis report and create a PowerPoint presentation on the positive impacts of ICT on the process of learning.
- Present two success-stories related to teaching using ICT (or two personal accounts of the same). Note links to the advantages outlined in the text. The accounts must highlight the important lessons to be learned (while noting significant risks and challenges).

Assessment

Formative evaluation

The evaluation of the learning activities is based on the quality of the learner's analyses, arguments, and examples, and the depth, richness and variety of their ideas. As well, the structure of the submitted work, how well it is organised, its style and language and presentation, are important. In line with these expectations, the evaluation of this activity will be weighted as following:

- Production of the synthesis report and PowerPoint presentation (50%)
- Presentation of success-stories/accounts (50%)

Activity #2 -crosscutting activity for all disciplines.

Title of the learning activity : Report on reading of your choice.

Introduction

Report on reading of your choice.

Activity Details

Choose two readings available on the Internet, draw from them two opposing or contradictory scientific opinions. Now report (in 600 words, about two pages) information from various sources – what does this demonstrate? For example – both Darwin's theory of evolution and Creationism are found on Wikipedia (www.wikipedia.org). Your report should conclude by

drawing out the challenges you may face in this context, as a teacher working with students.

Assessment

Formative evaluation

- The authenticity of the readings (20%)
- The brief resumé of the two texts (40%)
- The critical analysis of the readings (20%)
- Presentation of the material, within the defined parameters the assignment (20%)

Unit Summary

This unit provides an understanding of the many theories found in the pedagogical integration of ICT in the STEM courses.

Unit Readings and Other Resources

The readings in this unit are to be found at course level readings and other resources.

Unit 2. Generic ICT Tools and Resources in Biology

Unit Introduction

This unit introduces the tools and reading materials on integration of ICT in Biology. A wide range of tools are introduced for the generic use in ICt particularly in Biology, such as inspirational software, thinkGraph.

Unit Objectives

Upon completion of this unit you should be able to:

- Use their ICT skills to help students organize an information search on the Internet;
- Model a food web using the tool;
- Develop a conceptual map of an ecosystem with a chart plotter.

Key Terms

Food chain: The food chain can be understood as a set of living creatures linked together in a process of production and consumption of energy and matter in a given ecosystem.

Food Web: a nested set of food chains that connect the bodies of an ecosystem.

Ecosystem: This is the structural and functional unit of the biosphere, and is a group of biological communities coexisting in the same physical environment.

Collaborative work: It is an activity in which learners perform all work using the tools of distance communication.

Learning Activities

Activity 1.1 Conceptual map and modeling of a food web in an ecosystem.

Introduction

The integration of ICT in teaching and learning must be for the benefit of both teachers and students. Thus, in the spirit of a change in the pedagogical relationship in which the teacher is no longer a companion, and where the student would be the main actor in building their own knowledge, it would be helpful if the former can help the latter to use ICT in their learning. This module has the dual objective of improving the skills of teachers of biology to use ICT in their educational practices and to help students learn with ICT.

Activity Details

[Abstract of the learning activity In this activity, the learner takes stock of the various uses of ICT in teaching practice. It includes simple activities that require the students to use computers. The realization of a conceptual map on the ecosystem and modeling of a food web allows the learner to find teaching strategies that can improve student learning with and through computers. In this activity, much will be reserved for collaborative learning. Learners will individually and collectively seek effective strategies to encourage students to integrate the tool in their learning.

List of important readings for the activity

Text 1

Hoch, Thierry (1998). Modélisation du réseau trophique pélagique et de la production primaire en Manche. 15 p.

Abstract

This paper presents the model of the pelagic production in the Channel. It deals with biogeochemical cycles, particularly nitrogen. In other words, it is to understand how is the transfer of autotrophic food (Diatoms, Dinofagellates ..) to autotrophic (Mesozooplankton, Microzooplancto).

Rationale

This text offers a model of trophic relationships that can be analyzed as part of a class. This model can help acquire skills in modeling.

Abstract

Inspiration is a software helps design conceptual maps, diagrams, and graphs. It allows the preparation of a presentation.

Rationale

It facilitates the preparation of a presentation and therefore helps to better teach and learn better. You can download it. There are also tutorials.

Resource 2

ThinkGraph

http://thinkgraph.software.informer.com/

Abstract

ThinkGraph is also a 2D drawing software. It can make conceptual maps using a methodical organization of ideas.

Rationale

We recommend you to use this tool, because it will be of great use in your lessons. Your students can also easily master it.

List of important links for the activity

Link 1 : The biodiversity of the reef ecosystem

http://www.ggl.ulaval.ca/personnel/bourque/s4/ecosysteme.recifal.html

Abstract

This site outlines the organisms in a reef. The approach is quite interdisciplinary in that the geological, geomorphological and ecological are taken into account. It crosses these fields but also includes very beautiful images of shellfish and other benthic organisms.

Rationale

This site is worth visiting because it reinforces your mastery of the concept of an ecosystem.

Link 2 : Modeling of a marine ecosystem

http://www.mumm.ac.be/FR/Models/Development/Ecosystem/index.php

Abstract

The question is addressed as a very interesting question: How do we develop models? Why use models of an ecosystem?

Results: In the opinion of the author, ecosystem models require the coupling of a biological model and a hydrodynamic model.

Rationale

In this text, already very informative on the academic side, you find elements of simulation on the evolution of chlorophyll concentration based on the time of year.

Detailed activity description

This activity is subdivided into tasks which contribute to achieving the twin goals of improving the skills of teachers of biology, and, secondly, to use ICT in their educational practices to help students learn with and through ICT.

The beneficiaries of the training are divided into groups of 2 to 5 according to the size of the class in order to rotate individual work and collaborative work.

Readings are completed, and consulting resources and links on the subject of study (ecosystem) are available on the one hand, and the teaching strategy (integration of ICT) on the other.

Then, we have the development of a trophic network model and a conceptual map of an individual ecosystem, preceded by an Internet search of images of animals (eg lion, vulture, antelope) and plants (grass).

Each recipient sends an email of its production to group members, and receives productions in return from others.

Observations of each other will help to develop a conceptual map accepted by all group members and the adoption of a food web model.

Similarly, each trainee has a procedure to be performed by students of conceptual maps and models using computer tools. A summary of these proposals is developed and shared by members who adopt a final version. Each member produces a reflective report on the work they have done.

Learning activities

The activity is divided into different stages or tasks as follows.

Task 1: Reading and research information

Required reading of texts related to the learning activity and consulting resources, Links and other websites. The task aims to familiarize the recipients of training with computer search tools (Google and other search engines), but also to identify the key concepts (energy, cycle), concepts (food web, food chain) and less important concepts (producer, consumer) to be used in developing the conceptual map on the ecosystem and food web model.

Task 2: Choosing a Model

Selecting a model diagram from the menu «Insert» of the computer, or a software implementation of conceptual maps (Inspiration 7 Trial, ThinkGraph, CmapTools, MindMapper). Focus on free software.

Task 3: Operation of the model chosen

Realization of food web models and conceptual maps from the model chosen. Define the meaning of arrows and annotate the production to make unambiguous understanding.

Task 4: Procedure

Developing a procedure for modeling and construction of the diagram tool for students. It will be for the learner to list the stages of implementation.

Task 5: Communication and collaboration

Exchange on the three individual products (conceptual map, network model, operation mode) and observations of movement between the group members.

Task 6: Method of transfer of skills

Learners take ownership of the consensus procedure. The proposed approach will help students and learners to utilize the tool in their learning.

Assessment

<u>Formative evaluation</u>

Check the correct answer(s).

1. The coastal areas account for 8% of the ocean surface

- ☐ True
- ☐ False   (0.5 point)

2. Coastal areas provide a quarter of marine carbon

- ☐ True
- ☐ False

3. (10.25 points)

The modeling of an ecosystem implies

- False Using a physical model
- Using a biological model
- The coupling of a model and a biological model

4. What form (state) is the carbon in a marine ecosystem? (4 pt)

5. Here is a list of words. Organize them into a conceptual map to four entries from the basic concept. (7 points)

environmental factors, food chain, energy flow, temperature, lake, moisture, land, sunlight, consumer of wind, light, ecosystem, producer, cycle of matter, lion, antelope, decomposer, marine bacterium, functioning, urban, productivity

6. What is eutrophication ? (10.25 point)

Correct answers

1. True

2.   False

3. The coupling of a model and a biological model

4. State: - inorganic - detritus - benthic organic - phytoplankton

5. See below

6. What is eutrophication ?

Écosystème

Chaîne alimentaire

 Facteurs écologiques

 Producteur   consommateur   décomposeur

Antelope Lion bactérie

Activity 1.2 - Written report on compulsory reading

Introduction

Reading is an especially important activity in Open and distance learning. To best grasp the concepts of the pedagogical integration of ICT, the readings for each activity are compulsory. Two texts accompany activities #1.1 and #1.4, and a single text for #1.2 and #1.3

Activity Details

[Learning activity # 1.1

Title of the learning activity: Summary of critical Reading

Summary of learning activity

Read thoroughly the UNESCO (2004) text on continuing education for teachers, and the integration of ICT in scientific disciplines (lessons-learned and best practices for ICT in Mathematics, Biology, Physics and Chemistry teaching programs).

Reference for the compulsory reading:

- UNESCO (2004). Technologies de l'information et de la communication en Éducation : Un programme d'enseignement et un cadre pour la formation continue des enseignants. Division de l'enseignement supérieur. ED/HED/ TED/1

- UNESCO (2004). School networkings: Lessons learned. Bangkok: UNESCO Bangkok (ICT lessons learned series, Volume II).

Detailed description of the activity: suggestions for completing the assignment

Read the UNESCO (2004) text and produce:

- A 3-page (maximum 1300 words, 1.5 line spacing) summary report. The report should clearly bring out the major points of a professional development plan that would allow teachers to succeed in integrating ICT in their discipline.

- A synthesis table presenting the basic skills necessary to apply ICT in pedagogical practices.

- An analysis of the important themes developed in the two texts, noting opportunities to integrate them in your discipline or teaching practices.

Assessment

Formative evaluation

The evaluation of the learning activities is based on the quality of the learner's analyses, arguments, and examples, and the depth, richness and variety of their ideas. As well, the structure of the submitted work, how well it is organised, its style and language and presentation, are important. In line with these expectations, the evaluation of this activity will be weighted as following:

- Summary report (40%)
- Synthesis table of basic ICT skills (30%)
- Analysis and opportunities for integration (30%)

Learning activity # 1.2

Title of the learning activity: Creation of a trainer profile in distance learning.

UNESCO (2002). Teacher Education Guidelines: Using open and distance learning. Education sector, Higher Education Division, Teacher Education Section in cooperation with E-9 Initiative.

Summary of the learning activity

Fundamentals concerning the use of ICT by teachers in the context of Open and distance learning.

Detailed description of the activity: suggestions for completing the assignment

Having read the UNESCO (2004) text (ref. lesson activity 1.1):

• Write a brief critique (600 words, or two pages at 1.5 line spacing) responding to the major challenges faced by teachers in Open and distance learning, as presented in the text.

• Illustrate, in a table, the competencies required of, and the ideal profile for, an Open and distance learning educator.

Assessment

Formative evaluation

The evaluation of this activity will focus on both content and presentation. 60% will be dedicated to the quality of the analysis, and 40% to its presentation, particularly the competency table.

Learning activity # 1.3

Title of the learning activity: Reading critique.

Tchameni Ngamo, S. (2006). Tchameni Ngamo, S. (2006). Principes pédagogiques et Théories de l'intégration dans l'Education. AVU. Atelier de dévelop- pement de Contenu pour formation d'enseignant. Nairobi - Kenya, 21st Août au 2 Septembre.

Summary of the learning activity

The theories and guiding principles of the pedagogical integration of ICT in education.

Detailed description of learning activity: suggestions for completing the assignment

Read thoroughly the text on the fundamentals of ICT integration in education, and write a report that briefly (in two pages, 1.5 line spacing) presents the important aspects of ICT integration, as outlined in the document.

In an additional section, critique the text, and relate its themes to professional development for educators.

Assessment

Formative evaluation

The evaluation of the learning activities is based on the quality of the learner's analyses, arguments, and examples, and the depth, richness and variety of their ideas. As well, the structure of the submitted work, how well it is organised, its style and language and presentation, are important. In line with these expectations, the evaluation of this activity will be weighted as following:

- Report on the reading (50%)
- Critical analysis and link to professional development (50%)

Learning Activity # 1.4

Title of the learning activity: ICT impact "success stories".

Reference for the readings

Becta (2005). The Becta Review 2005: Evidence on the progress of ICT in Education. Becta ICT Research

Becta (2002). Impact CT2: The Impact of Information and Communication Technologies. ICT in Schools Research and Evaluation Series - No. 7, Department for education and skills.

<u>Summary of the learning activity</u>

Various positive impacts of ICT use in mathematics and science.

Detailed description of the activity: suggestions for completing the assignment

Begin by reading the two Becta (2005, 2002) texts on the evidence of positive impacts of ICT on learning, then:

- Write a one-page synthesis report and create a PowerPoint presentation on the positive impacts of ICT on the process of learning.
- Present two success-stories related to teaching using ICT (or two personal accounts of the same). Note links to the advantages outlined in the text. The accounts must highlight the important lessons to be learned (while noting significant risks and challenges).

Assessment

<u>Formative evaluation</u>

The evaluation of the learning activities is based on the quality of the learner's analyses, arguments, and examples, and the depth, richness and variety of their ideas. As well, the structure of the submitted work, how well it is organised, its style and language and presentation, are important. In line with these expectations, the evaluation of this activity will be weighted as following:

1. Production of the synthesis report and PowerPoint presentation (50%)

2. Presentation of success-stories/accounts (50%)

Activity 1.3 - Report on reading of your choice

Activity Details

Choose two readings available on the Internet, draw from them two opposing or contradictory scientific opinions. Now report (in 600 words, about two pages) information from various sources – what does this demonstrate? For example, both Darwin's theory of evolution and Creationism are found on Wikipedia www.wikipedia.org. Your report should conclude by drawing out the challenges you may face in this context, as a teacher working with students.

Assessment

Formative evaluation

- The authenticity of the readings (20%)
- The brief resume of the two texts (40%)
- The critical analysis of the readings (20%)
- Presentation of the material, within the defined parameters of the assignment (20%)

Unit Summary

The tools and resources contained in this unit can be used in biology as well as other courses.

Unit Assessment

Each activity contains its assessment and grading scheme.

Unit Readings and Other Resources

The readings in this unit are to be found at course level readings and other resources.

Unit 3. Distinct ICT tools and Resources in Biology

Unit Introduction

This unit involves outing, which is an educational activity that requires preparation, execution and operation. Each of these steps can be a reason to organize collaborative work using ICT and contributing to solving a problem. The outing will thus be a pretext to encourage the biology teacher to integrate ICT in their lessons and to organize activities for problem solving and collaborative work by students.

This activity will enable teachers to improve their teaching practices during outings, and for students to gradually build their knowledge using ICT.

the unit also covers training on the use of particular software for biology. In the case of biology, various simulation tools are available for example; mitosis, cell movement, phagocytosis, the uptake of CO2 by plant growth or action of certain substances on plant development, etc

Unit Objectives

Upon completion of this unit you should be able to:

- Define the terms of integration, collaboration, problem solving;
- List collaboration tools available to students
- recall the different criteria for assessing an animation tool.

    After training, learning will be able to

- Seek additional information;
- Guide students in finding information on the Internet;
- Assist students to properly use e-mail accounts open for them;
- Direct a chat or a forum
- Correctly use an animation tool in their teaching practice;
- To offer, in collaboration with colleagues, an evaluation sheet for animation tools.
- Identify key areas of application of ICT based activities carried out on human reproduction, in particular, and life sciences and earth sciences in general;

- achieve, through collaborative work using a computer, a conceptual map on the main areas of application of ICT in teaching human reproduction, in particular, and life sciences and earth sciences in general;

- know when and how to use ICT in learning activities in reproductive biology, in particular, and life sciences and earth sciences in general;

- produce a reflective report on their activities.

Key Terms

Educational outing: This is an educational activity that takes place outside the classroom and is designed to examine natural phenomena in situ.

Problem Solving: is an educational-based approach implementing evidence to solve a given problem and involves an individual or team-oriented effort

Integration: This is the process by which the teacher brings ICT into their teaching practice.

Collaborative work: It is an activity in which learners perform all work using the tools of distance communication.

Simulation: The animated simulation of a natural phenomenon is a reproductive strategy of a complex phenomenon for scientific, recreational or training purposes.

Animation: setting a process in motion by assembling film still images consti- tuting the course of action.

Chat: a form of synchronous communication in writing using a computer and allowing participants to discuss a given topic

Forum: is a form of asynchronous communication in writing using the resources of a computer where each participant makes a contribution that will be read later by other members.

Puberty: is the stage of development in a man which translates the passage from childhood to adolescence, in other words of infertility to fertility. It is during this stage that there is development of secondary sexual characteristics in boys (hair, deeper voice, ejaculation ...) and in women (the appearance of breasts, menstruation, development of the hips ...).

Sexual cycles: it is a cyclical period of time that takes place entirely on physiological and anatomical changes in an individual. Cases of menstrual cycles in women are an example.

Hormone: Chemical substance produced by endocrine cells and acts through the bloodstream to regulate the action of specific organs

Learning Activities

Activity 1.1 - Collective achievement of a database on wildlife reserves and gazetted forests of my country

Activity Details

Reading 1

http://fr.wikipedia.org/wiki/Bien-être_animal

Abstract

The welfare of animals is historically noted with reference to culture, religion, and under legal and philosophical context. The nutritional aspect is addressed along with the five basic needs of animals: freedom from pain, injury or illness; climatic stress or physical hunger, thirst, malnutrition, fear, and the possibility to express normal behavior.

Rationale

This text is important in that it raises awareness about animal welfare. It will allow learners to become more aware of animals. The general idea will be introduced in the report, including the legal and moral aspects.

List of important resources

Resource 1

Complete reference

The Clionautes

Eric Mauriange (2003) : PAYSAGES ET TICE. Des ressources pour ensei- gner…

http://www.clionautes.org/spip.php?article214

Abstract

This site offers several sites on the use of ICT. For example you will fnd: landscape Sciences («scientific» knowledge of online teaching). Online university courses; Didactics and Pedagogy landscape (consulting, methodology, examples of application with reflective thinking ...) Resources (Guidelines or resources for progress) and many other exciting aspects. Each site offers resources, but also elements of learning that will be useful in carrying out ecological outings.

Rationale

This site takes you to a wealth of information on teaching practice in terms

of educational outings and the approach to landscape using ICT. An excellent website.

Resource 2 : Compilation CD of biological images

Abstract :

This CD Rom is a bank of images on different levels of biology:

molecular, cellular, tissue, organ, organism.

Rationale:

 The CD ROM is a learning resource. You can use it to illustrate your lessons or to develop content for a formative or a summative evaluation.

Detailed activity description

The biology teachers will attend the educational outings. The activity takes place in three stages: preparation of the outing, the outing itself, and exploitation. In the field, students are divided into groups to perform various tasks: observation of plants and animals, soil characterization, terrain characterization, collection of samples, measurement of temperature, and water properties.

The outing will be a pretext to have the teacher integrate ICT in their lessons and to organize project activities for a database of parks and reserves of the country by the collaborative work of students.

Students are divided into groups of 2 to 5 people (depending on the amount of students enrolled) to research and organize information on the Internet.

- Group 1: Making a herbarium on the main plants of parks and reserves of the country (mangrove, Acacias, ...).
- Group 2: Assembling a compilation of insects and animals characteristic of large parks and reserves of the country.
- Group 3: Working on landscapes and ecosystems, and major constituent of parks and reserves of the country.
- Group 4: Working on regulatory and legal texts relating to parks and reserves of the country (Charter, codes, conventions).

The e-mail accounts are open for students who communicate and share documents and are found in the fle in the library of the platform. These documents will be available later on.

The teacher will open a chat and a forum for synchronous and asynchronous communications.

Preparation of the outing (1 hour).

- Distribution of students in groups of 2 to 5 people. Group management with a spreadsheet

- Developing an outline of the final report (summary)

- Presentation of instructions (permission from parents of students, apparel, equipment, etc..)

Outing (3 heures)

Observing animals

- Guidelines to follow for comments
- Identification of some species
- Instructions for finding information on the Internet
- Observing vegetation
- Instructions for comments
- Identification of some species

Exploitation of the outing *(4 hours)*

Assessment

<u>Formative evaluation</u>

Rank the following actions under the headings:

1. Preparation of the outing

2. The outing itself

3. Exploitation of the outing

Group work; measurement factors; means of transport; parental consent; reporting; assessment; safety compliance, information from colleagues, seeking information, administrative authorization, answer students' questions; adaptation the level of my students, lesson preparation, taking notes, objectives, photos, setting a start time, day chosen. (3 points)

Lists three wishes for the environment that you have visited (2 points).

Write an essay of 300 words or less on an animal, plant or harm to the environment that you have visited (5 points).

Put yourself in the shoes of each of these individuals, and try to express the perception of each (5 points).

- Fisherman
- Farmer
- Prof of SVT
- Physics prof
- Charlatan
- Child
- Nurse
- Housewife
- Forester

Research 5 Internet sites that deal with the educational outing (5 points)

Correct Answers

Preparation of the Outing	Outing	Results of the Outing
transport	Group Work	Summary
parental authorisation	Measure of the Factors	Security respected
subscription	Taking notes	Research of complement information
information of colleagues		Answers students' questions
administrative authority		photos
adaptation to students		
preparatory lesson		
fixed objectives		
fixed departure time		
day chosen		

2. open question

3. open question

4

Person	Perception
Fisherman	Fished all year, ended problems
Farmer	Irrigation. Security and self-nutrition assured
Prof of SVT	What a beautiful ecosystem
Physics prof	There is a method to reduce evaporation and evapotranspiration
Charlatan	Libations for the whole year
Child	A natural pool for swimming all year
Nurse	That explains the high incidence of schistosomiasis
Housewife	Unlimited water for laundry/drinking
Forester	Good man

Activity 1.2 - Development of analytical tools for animation and simulation in biology

Introduction

ICTs have undoubtedly brought more value in the educational community. Strategies such as animated simulations were developed, and teachers used them more and more. The animated simulation is fantastic, wonderful, and exciting for the learners. But is this a reason for not conducting a thorough reflection on the issue, especially if it is known that the simulation slows or accelerates natural processes, ignoring certain conditions?

In the case of biology, various simulation tools are available on mitosis, cell movement, phagocytosis, the uptake of CO_2 by plant growth or action of certain substances on plant development, etc.. Are teachers making an effort to assess the simulation tools? Are they armed for that?

From the use of ICT, teachers' groups and teachers are asked here to work around a project to develop an evaluation sheet for animation or simulation . Resources are available to them, as well as collaborative tools. The beneficiaries of this activity all have an email address and the training platform offers spaces for collaboration through chat, forum and the library where they can file documents or obtain them.

Activity Details

List of important lectures

Reading 1

Collaborative work : What is Collaborative learning by Barbara Leigh Smith and Jean T. MacGregor

Abstract

This document deals with collaborative learning and provides information on the rationale of educational practice. The collaboration promotes the creation of collective knowledge but also socializes learners. It therefore relies on socio- constructivism. It applies to different learning situations. The approaches are as diverse as the goals and processes.

Rationale

This document is recommended, as there are several situations that may be helpful, particularly in understanding the concepts, applications and strategies.

Reading 2

Complete reference

Lestournelle R. (1988). Simulation en biologie http://www.epi.asso.fr/revue/49/b49p119.htm

Abstract

This text parts from simulation software, one on photosynthesis, the other on the electrophysiology of nerve fiber. The paper attempts to situate the use of simulation and comparative advantages with the real experiences before considering the future of practical work. It is a good document. It is critical.

Rationale

This document will guide you in developing criteria for evaluating simulation software.

Abstract

The author identifies the possible fields of application of the simulation (human biology, ecology, immunology). But it must be said that most of the text focuses on immunology.

Rationale

This document is offered because you will be able to locate the position of simulations in biology, but also take into account certain elements (time, environment) that may fall within the categories of assessment criteria.

List of important resources

Resource 1

Complete reference

Animation (CD to make from the products available) Compilation of Mamadou Sarr UCAD / FASTEF

Abstract

This folder contains an animated series in biology (genitals of women and men; in vitro fertilization) and site where you can find animations on various aspects of life sciences and earth (phenomena of subduction and accretion, greenhouse effect ...).

Rationale

The animations are made by the conceptions and perceptions of the authors. The approaches are necessarily different, even if the standard rules for developing animation or simulation exist. This diversity will help you target your evaluation criteria.

List of important links

Link 1

http://www.snv.jussieu.fr

Abstract.

This site provides the site «in high school biology». Various topics include: theoretical concepts, learning sequences, laboratories, links and various animations such as the penetration of sperm into the oocyte.

Rationale

The animations will help you and help students understand the facts of life that are accelerated. It is important that teachers become aware of this in order to avoid misrepresentation.

Link 2

http://www.didier-pol.net/

Abstract

The section «funny biology» of this site presents simple experiments for high school students.

Rationale

This site is recommended because it offers educational tools with easy access.

Description of the activity

The simulation tools used in the teaching / learning in life sciences and earth sciences are all of equal quality. The user must know to make the right choices and how and when to use them.

This learning activity, articulated around the development of an evaluation grid of simulation tools, is organized around fve tasks that will eventually achieve the objectives.

Task 1: Required reading of texts on collaboration and simulation. Additional resources and links are also available.

Task 2: Individual analysis of simulation tools available, or take in the sites provided by the tutor or the module designer.

Task 3: Sharing thoughts via internet or a platform: chat, forum

Task 4: Development of an evaluation grid and collective final acceptance of all group members.

Task 5: Report on reflective activity

Each of the tasks will achieve intermediate goals. The beneficiaries of the training are divided

into groups of 4 to 5 members. Each individual performs work that they submit to other group members. The various exchanges provided will allow the sharing of knowledge and methods of individual and collective work.

Each participant is asked to reflect on his personal background and performance.

Learning activities

Task 1: Required reading of texts on collaboration and simulation.

Each participant familiarizes themselves with the basic concepts of collaborative work, simulation and communication. It also isolates the criteria and implementation strategies.

Task 2: Individual analysis of simulation tools available, or to take in the sites provided. It is open to the learner to visit other sites on animation and simulations.

Each trainee gets into sites that are communicate 5 simulation tools. He/she observes and analyzes each image using the criteria that they have identified:

- Sequencing of activities: different times? continuous phenomenon? ...
- Time: how is it addressed? shortened? lengthened? variable depending on the importance of sequences ....
- Existence of sub-themes.
- Environment? ...
- Image quality ?.....
- Etc ... ..
- They will also give their assessment on each image by addressing such issues as follows:
- Why this simulation is important for its course?
- How they intend to use it in their course?
- When will it be used?
- What are some limitations?

What will the students gain ?

Following this, the student will build the first draft individual of the evaluation grid of simulation tools.

Task 3: Sharing thoughts via internet or a platform: chat, forum

Each member sends a file attached by e-mail to to all other group members.

Each member is assessed on each of the grids and sends their comments to all other group members.

Each participant will have all the comments with a second draft of a grid specific assessment.

Task 4 : Development of an evaluation grid and a final group

As part of a chat or a forum, participants suggest content items of the final grid that will be a synthesis of individual productions. The outcome of this phase is that group members agree on a final grid.

Task 5: Report on reflective activity.

Each group member is developing a reflective report on, among other things, the

following points:

- What have I learned? the conceptual, technical, organizational and individual group work, collaboration;
- How did I learn?
- What helped me in my learning?
- How much time did I spend on this activity?
- Am I satisfied with my participation in this collective production?
- What will my new skills change in my own professional activities,   including my choices and uses of simulation tools?
- What are the difficulties I have encountered?
- How can I do to pass these skills on to my students?

Assessment

Formative evaluation

1. Look up 5 definitions of the following words in a virtual dictionary

(Encarta), a paper dictionary, encyclopedia and two other sites: Simulation, Animation, Multimedia

Submit a synthetic definition from these definitions

(4 points)

True / False question (1 point)

2. Check the correct answer.

The animation is done on the basis of several images. True / False

3. Research on the Internet (give the URL of the sites) (15 points)

- 3 frames of animation on human reproduction
- 3 frames of animation on the geology
- 3 frames of animation on protozoa
- 3 frames of animation on mitosis
- 3 frames of animation on the ecosystem

Correct answers

1. Open answer

2. True

3. Open answer

Activity 1.3 - Teaching and learning biology with and by ICT

Introduction

The information technology and communication (ICT) is developed in the educational field. Teachers of biology use it to present or introduce an activity or an illustration, or explaining a fact or a process. This activity will help the benef- ciaries of training to realize the large potential of information technology and communication (ICT) to improve educational practice in the field of biology in particular, and life and earth sciences in general. In other words, with the course on human reproduction that will support this learning activity, there will be comprehensive ICT applications in:

- research tasks and organizing information
- educational tasks (PowerPoint presentation, use of an exercise for self-assessments and appraisals, communication and collaboration, modeling);
- administrative tasks (manage the course and grades of students by using an
- Excel spreadsheet, for example);
- social tasks (opening the school to social pooling). These tasks will be the pretext to identify the uses of ICT in teaching and learning of biology.

Specific knowledge objectives

After the activity, you will be able to:

- define the fundamental concepts of integration, collaboration;
- define the concepts of puberty, viviparity, internal fertilization, physiological
- regulation, cycles, hormone;
- quote various possibilities for integration and use of ICT in teaching and
- learning in biology and more specifically on human reproduction.

Activity Details

List of important lectures

Text 1 : Je peux transmettre la vie…

Pierre STOUFF

http://pst.chez-alice.fr/svtiufm/vie.htm

Abstract

This course on reproduction is divided into 5 chapters: Reproduction in both sexes; Fertilization and cooperation; Inheritance; Medical and non-medical applications; Ethics of reproduction. The approach is novel and differs from the textbook.

Rationale

This text is offered for the original approach you will be aware of different aspects of the theme of reproduction. The very expressive illustrations will be useful for design work with your students.

Text 2 :

Groupwork :

What is Collaborative learning ? by Barbara Leigh Smith and Jean T. MacGregor

Abstract

This document deals with collaborative learning and provides information on the merits of this educational practice. The collaboration promotes the creation of collective knowledge, but also socializes the learner. It therefore relies on socio constructivism. It applies to different learning situations. The approaches are as diverse as the goals and processes.

Rationale

This document is recommended because it presents several situations that may be helpful, particularly in understanding the concepts, applications and strategies.

List of important resources

Resource 1: Animated videos of male and female genitalia

Abstract :

These videos show the structure and operation of the genitals of men and women. For example, for the woman, the external and internal organs are shown, but also the development of the follicle, ovulation, and a part of fetal life.

Rationale:

These videos will be very useful because they present very interesting teaching materials to illustrate a course on reproduction.

Resource 2 : Compilation CD of biological images

Abstract :

This CD Rom is a bank of images on different levels of biology:

molecular, cellular, tissue, organ, organism.

Rationale

The CD ROM is a learning resource. You can use it to illustrate your lessons or to develop content for a formative or a summative evaluation.

List of important links

Link 1: Fertility.com

http://www.fertility.com/en/index.html

Abstract

This site offers questions and answers on practical aspects of life: Assessing fertility; understanding fertility; optimizing your fertility, infertility in women and in men ...

The issue of pregnancy (process, hormones) is also discussed. Real-life examples are reported.

Rationale

This site will help you meet and find answers to practical situations. It complements the academic dimension addressed in the readings. The style is very simple, which adds clarity to the words.

Link 2 : 9 months and more

https://unityhealth.com/health-wellness/health-management/pregnancy/9-months-and-more

Abstract

This site deals with embryonic and fetal development. The agenda begins during the first week of pregnancy. Other topics are also taken into account such as fertility, conception and motherhood. It offers strategies to monitor your condition and that of the child.

Rationale

We recommend you visit this site that will inform you on many aspects of reproductive health and give you practical advice.

Link 3 : Normal chronological development of the embryo

http://www.babycenter.com/0_fetal-development-timeline_10357636.bc

Abstract

In this site you will find details of embryonic development, including tissues and organs that develop with age. Very useful for those wishing to learn more on embryogenesis.

 Rationale

Take time to visit this site. It will complement your information. The items you find there will certainly fuel an evaluation questionnaire.

<u>Detailed activity description</u>

The completion of this activity requires several tasks, including linking the activities of teaching and learning with opportunities to use ICT. Working groups will be organized. Working sessions will alternate with individual sessions of collaborative activities. Eventually, a collective production of a conceptual map will be available for members of each group.

Learning activities

Task 1 : Census from the texts of proposed actions undertaken in biology education: Example:

- Microscope observation of sex cells (sperm and oocytes), early stages of embryonic life.

- Diagram of the reproductive tract of man or woman or as part of the ovary. Ability to edit an image in Paint
- Plotting curves on the changing hormone levels during the ovarian or uterine cycle in women. Simulations can be obtained with the computer
- Formulation of exercises
- Recording student's grades
- Laboratory experiments, diagram, assessment, student's grades, etc. ...

Task 2 : Teaching of biology where you use the computer as a tool: Example: PowerPoint presentation, researching information.

Task 3 : Development of a table summarizing the correspondence between activities and the possible uses of computers.

Task 4 : Sharing of individual productions and discussion in a chat, forum or e-mail.

Task 5 : Reflective report on the activity

Each group member develops a reflective report on the following points::

- What have I learned? Of the conceptual and technical, of organizing individual and group work, of collaboration.
- How did I learn?
- What helped me in my learning?
- How much time did I spend on this activity?

- Am I satisfied with my participation in this collective production?

What will my new skills change in my own professional activities, including my choice, use and integration of computer tools?

- What are the difficulties that I have encountered?
- How can I do to pass on these skills to my students?

Assessment

<u>Formative evaluation</u>

True/false questions   (0.5 points per question) Check the correct answer.

1. Ovaries (female gonads) are developing the human fetus between the   4th and 7th week of fetal life

- ☐ True
- ☐ False

2 Primary follicles appear at puberty.

- ☐ True
- ☐ False

3. In postmenopausal women the ovary has feedback on the pituitary.

- ☐ True
- ☐ False

4 . The frst ovarian follicles appear only in the 16th week of gestation.

- ☐ True
- ☐ False

5. Ovulation releases a primary oocyte

- ☐ True
- ☐ False

Multiple choice questions (10.25 points per question) Check the correct answer.

6. The organ of gestation is

- ☐ The vagina
- ☐ The uterus
- ☐ The Fallopian tube

7. Ovulation lasts

- ☐ seconds
- ☐ minutes
- ☐ hours
- ☐ days

8. The testicles begin producing testosterone as of :   (0.75 point)

- ☐ the fourth week
- ☐ the sixth week
- ☐ the eighth week
- ☐ the tenth week

9. The ovulation rate is :

- ☐ the number of oocytes released at the same time
- ☐ the number of oocytes possessed by the female
- ☐ the number of oocytes expelled by a woman in her lifetime

10. A woman has, over the course of her life:

- ☐ 600 ovulations
- ☐ 300 ovulations
- ☐ 200 ovulations
- ☐ 100 ovulations

11. Which of the is false ?

- ☐ Karyogamy restores the diploid,
- ☐ Karyogamy triggers the destruction of the envelope of the spermatozoid
- ☐ Karyogamy awakens the female gamete
- ☐ Karyogamy ensures the determination of chromosomal sex.

Matching questions (1.5 points)

12. Associate the following cells to their secretions.

Sertoli cells	Progesterone
Leydig cells	MPF (meiotic preventing factor and inhibitin)
Luteal cells	Testosterone

13. Vocabulary (0.5 point per word found) What is another name for :

Rules Endometrium Mucus Spermiduct Rut Karyogamy

Follicular degeneration

14. What are the four stages of spermatogenesis? (2 points)

15. Label the following schematic (3 points)

Modifed from http://www.svt.edunet.tn/Zaghouan/svtza01/accueil.htm

Correct answers

1. True

2. True

3. True

4 . True

5. False

6. The organ of gestation is the uterus

7. Ovulation is a phenomenon that lasts several minutes

8. The testes begin producing testosterone from the eighth week

9. The ovulation rate is the number of oocytes released at the same time

10. A woman, during her sexual life, has about 300 ovulations

11. The karyogamy triggers the destruction of the envelope of the spermatozoid

12. Cell/secretion associations

Sertoli cells secrete MPF (Meiotic Preventing Factor and inhibin)

Leydig cells secrete testosterone

Luteal cells secrete progesterone .

13. Vocabulary.

Rules = menstruation Endometrium = uterine mucus Mucus = glair

Spermiducte = vas deferens

Rut = estrus

Karyogamy = amphymixia

Follicular degeneration = follicular atresia

14. The four stages of spermatogenesis are: Phase propagation; growth phase, maturation phase, differentiation phase (spermiogenesis)

 15. Labeling :

Unit Summary

The content of unit 3 focussed on the specific tools and resources that are purposely for biology using ICT.

Unit Assessment

Each activity contains the activity and assessment of the activity

Unit Readings and Other Resources

The readings in this unit are to be found at course level readings and other resources.

Unit 4. Synthesis of the Module

Unit Introduction

Summary of the principles and theories of pedagogical ICT integration

The scientific literature contains a broad range of statements on the principles and theories of ICT integration into instructional practices. This module identifies 28 key principles regrouped into 5 main orientations, each comprising a set of professional competencies to be developed in a teaching/learning context. Accordingly, teachers must be able to:

Exercise critical judgment and sensitivity regarding the real benefits and limitations of ICT as teaching and learning resources.

This first orientation includes 5 key principles:

- Vigilance and careful assessment of the impacts of ICT on their students and on their own work
- Alertness to social inequality or exclusion resulting from inability to access resources
- The principle that ICT are not of themselves generators of innovative educational change
- The principle that ICT serve the behaviorist, cognitive, constructive, and instructive approaches equally well
- The principle that ICT should facilitate learning integration and transfer, make learning more meaningful, and help students develop their talents, imagination, resourcefulness, creativity, and the like.

Identify and assess the potential of computer software and networking technologies to develop targeted educational competencies.

The 5 key principles stemming from the second orientation are:

- Exploring a number of educational sites to identify appropriate resources in the teacher's subject area or teaching field

- Maintaining an activity bank to help students with their learning and to support other educational practices

- Assessing resources not designed for instructional purposes and adapting them for the competencies targeted in the study program. Evaluating tools and selecting those that best develop the intellectual and relational competencies targeted. An assessment of the potential of computer software and networking technologies to develop targeted competencies would appear to be critical for achieving educational targets, seeing that many commonly used resources (grammar checkers, Web sites, audiotapes and videotapes, CD-ROMs, etc.) have not been specifically designed for educational purposes.

- Determining instructional needs and equipment requirements and eliminating items that are attractive but of little educational value.

- A thorough analysis of educational software to evaluate the content breakdown, presentation of learning and/or problem-solving steps, tracking reportage, and data handling.

Identify and communicate with a variety of appropriate multimedia resources (e.g., email), collaborative tools to which ICT can make a significant contribution.

Using ICT effectively, teachers can build networks for information sharing and professional development in their teaching fields and practices, bringing together the work and reflections of individuals with similar interests but from disparate locations. This orientation includes 9 pedagogical principles of effective communication that generate a "collective intelligence":

- Collaboration, teamwork, joint action, and utilization of the collective intelligence of individuals located at a distance

- The use of thematic, research, peer email, discussion group, databank, image, and sound networks.

- Selection of interactive resources and audiences for specific objectives

- The necessity of establishing selection criteria for professional development resources

- The use of collaborative peer networks to help train new graduates as well as colleagues

- Building networks of teachers who share the same expertise

- Guiding student-directed interactive learning

- Helping students target, formulate, and refine their questions so that ICT information searches are relevant, meaningful and suitable.

- Careful precision in terms of the quality of language used.

Use ICT effectively to search for, interpret, and communicate information and to solve problems

To better integrate learning resources, the information obtained must be converted into secondary culture (i.e. schooling) objects through the development of knowledge transfer competencies. The use of ICT therefore imposes new demands on teachers' ways of working: how they structure collective teaching, teamwork, individual work in the classroom, and homework. In this perspective, teachers must adopt 4 essential principles to help students use ICT productively for research and problem solving:

- Targeting of information, and critical analysis and conversion or transformation of useful resources into learning objects for educational activities
- Tracking of students' progress and interrupting their work as needed
- Raising awareness of Internet navigation and providing guidance, e.g. pointing out pitfalls
- Getting students back on track through suggestions, questions, and tips to help students develop critical search strategies.

Help students familiarize themselves with ICT and use it to carry out learning activities, assess their own use of ICT, and exercise critical judgment toward the information they find on the Internet.

Teachers must also have certain competencies and abilities in order to support student learning with ICT. Accordingly, 5 fundamental pedagogical principles must be applied:

- Developing basic and essential ICT competencies, with an emphasis on computer literacy: Introduction to ICT functions and tools (familiarity with common software such as Word, Excel, PowerPoint, etc.) and basic operations (downloading, saving, and filing educational materials, compiling and organizing information).
- Choosing the appropriate tools for a given task, integrating a number of tools to solve actual problems, and using them on an everyday basis in a critical and productive way to serve as a model for the students.
- Using a diversity of ICT software to teach, learn, communicate, and solve problems in different subjects, and adopting clearly expressed, critical stance toward these technologies.
- Developing projects and the accompanying documentation (e.g., worksheets, digital portfolio) that integrate various aspects of the course content and extend the meaning of the information beyond the classroom.
- Evaluating the learning achieved through specific questions, effective work processes (e.g., integrated online self-evaluative learning, access to glossaries and extra class notes at Internet-accessible hypertext sites, etc.)

The following figure illustrates the main orientations of the key
pedagogical principles of ICT integration.
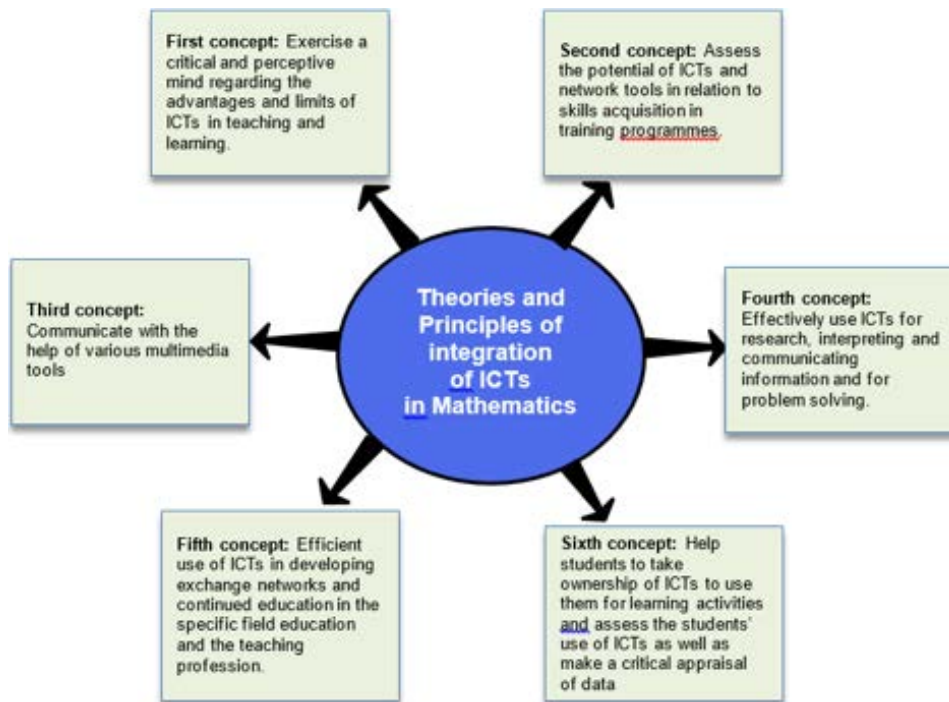
Learners should be able, through this module, to identify the key-concepts in the process of ICT integration, and to critically engage the required readings and resources (an important skill in Open and distance learning). Examples of learning activities, which can be modified to suit specific disciplines, are provided, as are a number of useful links (illustrated with screen captures), the latter presenting pedagogical resources and serve to guide educators and learners in their knowledge-seeking and training processes. A bibliography is provided to further support techno-pedagogical skills, facilitate research, lesson planning, teaching, problem-solving, professional development, and most importantly to enhance student's learning through ICT.

Synthesis specific to teaching and learning of biology

In the field of biology, this module allows learners to familiarize themselves with the key concepts of biology of both animals and vegetation, but also the ecology. The learning activities offered help to initiate collaborative work and to have the skills in information retrieval for a defined project. What is especially interesting in this unit is that it helps to teach better and discipline in a socio-constructivist approach.

This module use of ICT in biology revolves around three main axes, namely:

1. Identification of areas of ICT use in biology;

2. Development of collaborative work both in solving problems and in other

learning situations;

3. Research and information synthesis.

The first axis is taken into account in the activity of module 3. Virtually all activities developed in classroom are achievable in distance education. Even if work practices are supported by software simulation. The nature of activities (such as administrative transcript) teaching (drawing and annotation, production experience, evaluation) can be implemented and managed by distance learning through ICT.

Compared to the second axis, the module provides several sequences that work together. Achievement of tasks proposed and the reflective work that is requested at the end of each learning activity will help you self-evaluate and enhance your critical potential.

Regarding the search for information in Internet, it lies at the heart of all learning activities proposed.

Unit Assessment

Check your understanding!

<u>Summative Evaluation</u>

True / False

Check the correct answer

1. The ovaries have an anatomical bond with the fallopian tubes.

☐ True   ☐ False

2. Progesterone is responsible for the proliferation of the endometrium and secretion of mucus.

☐ True   ☐ False

3. The Caryopycnotic index measures the number of dead cells in vaginal

☐ True   ☐ False

4. The primary follicles appear at puberty.

☐ True   ☐ False

5. Testosterone is a hormone soluble in water

☐ True   ☐ False

6. Estrogen inhibits contractions of the myometrium.

☐ True   ☐ False

7. The ovary begins to form from the twentieth week of embryonic life.

☐ True   ☐ False

8. Testicular temperature is lower than that of the body.

☐ True   ☐ False

9. The placenta provides the synthesis of hormones responsible for the maintenance of pregnancy.

☐ True   ☐ False

10. Estrogens have a pre-ovulatory peak around 16 hours before ovulation.

☐ True   ☐ False

Multiple choice questions

Check the correct answer

11. ovulation rate is:

☐ the number of oocytes released at the same time

☐ the number of oocytes possessed by a woman

☐ the number of eggs fertilized during the life of a woman

12. Autocrine action is:

☐ stimulation of the secretory cell itself

☐ stimulation of neighboring cells without transport by blood

☐ stimulation of cells with transport by the blood

13. GnRH secretion in adult men is rhythmic and has:

☐ a peak every 40 minutes

☐ a peak every 50 minutes

☐ a peak every 80 minutes

☐ a peak every 90 minutes (P16)

14. LH stimulates:

☐ Sertoli cells

☐ Leydig cells

☐ follicular cells

15. The pH of the mucus of the cervix during the ovulatory phase is:

☐ pH = 5

☐ pH = 7, 8

☐ pH = 6, 2

16. During implantation,

☐ the morula enters the mucosa

☐ the blastocyst enters the mucosa

☐ the fetus enters the mucosa

17. Which of these hormones prevents the loss of the corpus luteum

during the embryonic phase

☐ LH

☐ FSH

☐ chronic gonadotropin hormone HCG

18. Vocabulary

What is another name for:

☐ Muscularis uterine

☐ Pouch

☐ Follicular cavities

☐ Rod

☐ Castration

19. What are the four functions of the ovary?

20. What are the functions of the testicle?

21. The diatoms are part of microzooplankton

☐ True   ☐ False

22. Barnacles live on which foor?

Supra-littoral Mid-coast Infra-littoral

23. The regime of an animal can sometimes change during its life

☐ True   ☐ False

24. Number the living organisms

Determine the number of trophic levels

Place each living organism in its trophic level

Put the living organisms in a food web

True /False

25. The approach «application» is classifed in the model stages of

teaching and learning.

☐ True   ☐ False

26 The process of integration of ICT is iterative.

☐ True   ☐ False

27. Multiple choice question. Check the correct answer ICT means

☐ information technique and communication

☐ computer technology and communication

☐ computer technology and communication

☐ Information Technology and Communication

☐ techno-information and communication

28. List the four phases of the continuum model approach to ICT development

Correct answers

True / False

1. False

2. False

3. True

4. True

5. False

6. False

7 False

8. True

9. True

10. 5 False

Multiple choice

11. ovulation rate is the number of oocytes released at the same time

12. An action is autocrine stimulation of the secretory cell itself

13. GnRH secretion in adult men is rhythmic and has a peak every 90

minutes (P16)

14. LH stimulates the Leydig cells

15. The pH of the mucus of the cervix during the ovulatory phase is pH = 7.8

16. During implantation, the blastocyst enters the mucosa

17. The hormone that prevents the disappearance of the corpus luteum

during the embryonic phase is HCG (chronic gonadotropin hormone)

18. Vocabulary

☐ Muscularis uterine = myometrium

☐ Pouch = scrotum

☐ Follicular cavities = antrum

☐ Rod = penis

☐ Castration = capon

19. The four functions of the ovary are: oogenesis, folliculogenesis,

ovulation and endocrine function.

20. The functions of the testis are spermatogenesis and endocrine

function

21. False

22. Intertidal

23. True

24.

25. False

26. True

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