

Development of ICT Curriculum Framework G11-12 (Stage 4) Nile Egyptian Schools (NES) December 2010

NES curriculum for ICT

Aims of NES ICT

The aims are to encourage candidates to:

develop a way of thinking reflecting the disciplines of computing, IT and ICT including logic, algorithm, abstraction, visualisation and attention to detail;

develop the skills, knowledge, understanding and attitudes to best apply the techniques of consultancy, project management, design and realisation within computing, product promotion, training and technical support;

develop an understanding of the implications of the pervasive use of technology through a broad experience of those technologies, an historical perspective and an informed discussion of potential future developments;

develop a competence in using technology through the study of hardware, software, systems, networks and programming

develop a moral, ethical and responsible attitude to the use of ICT in business, social and personal contexts;

The additional aims of the L2 curriculum encourage

candidates to:

apply their knowledge and understanding to the social, educational and leisure contexts;

apply their knowledge and understanding to a real-world commercial application of ICT;

develop an understanding of the holistic processes of systems development and its application in real-world contexts and their confidence in their vocationally orientated skills.

Assessment objectives of NES ICT

A Skills, B Knowledge and understanding and C Attitudes

A The candidates should be able to demonstrate skills of:

(L1)

abstraction (analysing and putting into visual form systems);

algorithm (representing in standard form the processes of a system);

coding (putting an algorithm into a machine executable format)

collaboration (generating a group product);

using generic software (word processor, spreadsheet, database, webpage editor, bitmap/vector graphics program, text editor);

capability (applying their knowledge and understanding to novel contexts).

(L2)

applying the skills above in novel situations

B The candidates should be able to demonstrate knowledge and understanding of:

(L1)

hardware, software, systems, networks, data and languages;

analysis, design, modelling, development, implementation, evaluation, presentation (systems life cycle);

programming through scripting, graphical programming interface, the writing of macros within software, software development kit or system instructions;

(L2)

the application of ICT in commerce, government and other organisations; and

the implications of the pervasive impact of technology on consumerism, employment, education and leisure.

C The candidates should be able to demonstrate attitudes of:

safe practice regarding virtual world avatars and on-line profiles and physical contact with others;

moral practice regarding negotiation, consultancy and training;

legal practice regarding use of information, computers and resources;

ethical practice regarding local policies and procedures;

egalitarian practice regarding collaboration, responsibility and leadership.

Assessment Procedures of NES ICT

2 papers

Paper 1 Knowledge and understanding (written paper)

Paper 2 Skills and capability (practical paper)

5 practical tasks performed under controlled conditions that enable the candidate to demonstrate:

- they can choose the appropriate software/process to complete the tasks;
- they have competence in using common applications*
- they can construct an executable program.

*spreadsheet, database, presentation package, web page editor, graphics editor and text editor;

NES ICT: curriculum topics

1. Consumerism L1 5 L2 5	Shopping: booking systems; comparison websites; advertising; technical/customer support; Transactions; internet auctions; banking and on-line currencies; presenting information; revenue affiliates; Downloads: music, film, software; apps; e-books; Technology: point of sale; bar code readers; electronic scales; RFID; asset tracking; stock control; logistics;
2. Employment L1 5 L2 5	Changing opportunities: unemployment; work patterns; employment opportunities within ICT Legislation: information/data protection; freedom of information; computer misuse; Health and safety issues: physical and psychological; safe working; lone working; Technologies: web/video/phone conferencing; IM; VoIP; email; scheduling; project management; asset/employee tracking;
3. Education and Information L1 5 L2 5	Technology in teaching and learning: VLE, e-portfolio, learning objects, Web 2.0 (WIKI, blog, forum, chat, chat room, VoIP); Administration/Assessment: record keeping; computer aided assessment; MCQ; quizzes; feedback; multimedia; assessment centres; authentication; ID, user ID, passwords; Expert systems/artificial intelligence: health services; Information services; weather, stocks/shares; traffic/GPS, CCTV/web cams; rail and plane movements; e-Government: public information; voting; payments; communication; electoral register services (passports, identity cards driving licences); legal information;
4. Personal L1 5 L2 5	Social implications of increased leisure time: digital television, DAB, satellite TV, film distribution, music, MP3 players/recorders, TV on demand, radio on demand, web-radio, interactive games, web-based games, social networking; Responsibility & E-safety: conduct; fair use; plagiarism; dealing with contact/content; Information: implications of access to personal information; personal profiles, avatar ID, computer fraud; identity theft;
5. Hardware L1 20 L2 20	Recognise, describe, classify and identify the affordances and relative values of: keyboards, pointing devices including mouse, touchpad, slates, IWB and tracker ball), video digitisers, visualisers, remote controls, class performance systems, joysticks, motion sensors, magnetic stripes, MICR, scanners, digital cameras, biometric devices, microphones, sensors, MIDI instruments, graphics tablets, OMR, OCR, barcode readers, video cameras, camera phones, web cams, light pens; monitors, printers (laser, ink jet and dot matrix), plotters, speakers, control devices (including motors, buzzers, lights and heaters), backing storage media (including magnetic tapes, CDs, DVDs, hard discs, memory sticks, flash memory; portable communication devices: mobile phones, personal digital assistants, GPRS, 3G, global positioning systems, satellite navigation systems, personal digital assistants, Bluetooth devices, web books, handheld computers, e-book readers, Describe the features and functions of current computer systems. Recognise, describe and identify the functions of internal components of a computer system.
6. Software L1 15 L2 15	Recognise, describe and identify the uses of software types: operating systems, generic/common applications software, user interfaces, utility software using the following terms: scheduling interrupt handling job queues and priorities 3memory management spooling LINUX Windows Apple RISC spreadsheet, database management system, web browser, web page editor, word processor desktop publisher, graphics editor, painting program, drawing program, image manipulation, animation software, screen capture software, spooling, tweening Recognise, describe and identify the values of programming languages. Choosing appropriate applications software to best meet the needs of the task.

7. Data representation L1 15 L2 15	<p>Describe: how data is represented, structured and managed (including archive, back-up, validation, verification and conversions: binary/denary/hex/octal file types); data types (number formats, date, string, character, currency, code) structures (1D/2D array, list, stack, queue, binary tree) management (LIFO,FIFO, binary tree traversals, sorting, searching) format (ASCII, Unicode), file types</p>
8. Systems L1 15 L2 15	<p>Describe the computer processes associated with real time computing including: air conditioning, central heating, refrigeration, car manufacture (robotics, assembly line), medical applications, intensive care, process control, weather monitoring, scientific experiments.</p> <p>Describe the hardware used to sense and control the environment: temperature pressure humidity moisture light sound level blood pressure acidity/alkalinity.</p> <p>Describe systems in terms of algorithms using visualisations: data flow diagrams, logic gates and logic diagrams, flow diagrams, truth tables</p> <p>Describe simulations and models of real situations (see 12 below).</p>
9. Networks L1 10 L2 10	<p>Describing network types and the associated hardware, software and protocols: LANs intranets Local email Hubs Switches Routers Dedicated cabling Servers proxy servers Network cards FTP HTTP Telnet SSH VPN Router software WLAN Circuit switching and packet switching internet servers VLE servers video streaming servers</p> <p>Security issues: compression, encryption, physical security, antivirus, anti-spam, spyware, Trojans, worms, viruses, user IDs passwords, acceptable use and data protection policies, authentication, shibboleth, confederation, backup, archive</p>
10. Analysis L1 10 L2 10	<p>Based on stages of the systems development life cycle: identification of problem through analysis of current systems: observation, consultancy, examination of documents, questionnaires, interviews, market research, public opinion poll, online data capture, data mining focussed data/information collection establishing the inputs, outputs and processing in the existing system observation, examination of documents, questionnaires, interviews, forum data, response to email, abstracting - description of the system use of diagrams process flow diagrams data flow diagrams system flowcharts producing a requirements specification identifying suitable hardware and software feasibility study</p>
11. Design L1 10 L2 10	<p>Based on stages of the systems development life cycle: design of system to fit requirements specifying the hardware and software designing data collection forms, screen layouts, report layouts, storyboards, validation routines required data/file structures and programming specifications; identify appropriate input, storage, output devices and the necessary data structures, relationships and processes; recognising the user/commissioner/developer requirements and needs, principles of consultancy; designing the user computer interface including web page design, website management, technical needs, developer needs; using program flowcharts and pseudocode to describe the steps of the algorithm.</p>
12. Modelling L1 10 L2 10	<p>Having a practical experience of some of these and a theoretical knowledge of all: simulations in virtual world, first and third person perspective; profit forecasts, creating profit/loss charts from data (spreadsheets); architecture using interactive 3D design, virtual world creativity; computer generated graphics of real/live data e.g. applying theoretical systems weather forecasting; serious games activity, air pilot training, triage training; testing/self-assessment simulation car driver training .</p>

13. Programming L1 25 L2 25	All students must show a proficiency in programming by accurately coding short routines (one rigorous programming language or one rigorous scripting language or a programming language and a scripting language*); types of languages, structure of procedural programs, syntax; programming constructs/control structures iteration, conditions, Boolean logic, recursion, subprograms/subroutines, procedures and functions, declaration (variables, constants), comments/formatting, string manipulation, input/output functions .
14. Development /Implementation L1 10 L2 10	Based on stages of the systems development life cycle: development, testing and implementation including project management types of programming errors, debugging strategies, testing strategies normal, extreme, strategic and normal data testing modules, whole systems, theory of project management, Gantt charts, timeline software, installation and execution of projects identifying the different methods of system implementation (parallel running, direct changeover, phased implementation and pilot running)
15. Promotion/ Support/ Evaluation L1 10 L2 10	Based on stages of the systems development life cycle: evaluating systems: efficiency, ease-of-use and appropriateness of the solution, systematic testing, user feedback and systems diagnostics; identification of limitations and areas for development, identifying improvements; use of visualisations: graphics, animation, publishing, flowcharts, program listings; producing designs for marketing/advertising including posters, advertisement in print, marketing, sales, promotional videos, web-based promotions, web-based sales [connection with commercialism]; training and support, writing training/support materials for end-user; writing technical/systems documentation for developer/maintenance support.

L1 10 L2 10 represents the indicative time commitment to that element of the curriculum based upon a 160 hours per year study time. During each year (L1 & L2) every candidate should participate in a collaborative project (in a group of at least 3 people) involving some form of programming/scripting* and going through the design cycle (observe, identify, research, specify, design, develop, test, implement, promote, support, evaluate) at least once. In the examination (skills paper) the candidate will be asked to describe their project, the nature of the collaboration (division of labour), their contribution to the project and a specific aspect of the project.

*Programming and scripting languages

Rigorous programming languages		Introductory programming languages		Rigorous scripting languages		Basic scripting languages	
JAVA Prolog C, C++, C#	Pascal Visual Basic Delphi	Scratch Greenfoot BASIC	Kodu VBA	Flowol PHP SQL PERL	JavaScript Python ASP VB in HTML	HTML AppleScript VBScript	scripting prims in Second Life™