ICT Programming & Logic Essentials Learning Objectives

ICT Domain 4: Programming & Logic Essentials **Learning Objectives**
Sub-Domain 4.1 **Demonstrate fundamental knowledge of programming languages and how they are used to communicate with computers.**
4.1.1 Define "programming," and discuss its role in computing.
4.1.2 Explain the binary representation of data and programs in computers. 4.1.3 Distinguish among the three types of programming languages (machine, assembly, high-level), and give examples. 4.1.4 Compare and contrast languages that are usually compiled (e.g., C++, Java) and interpreted (e.g., JavaScript, Python).
4.1.5 Describe the structure of a simple program, and explain why sequencing is important. 4.1.6 Write a program design document using pseudo-code that shows program flow.
Sub-Domain 4.2 **Demonstrate the use of logic and problem-solving, and relate these concepts to computer programming.**
4.2.1 Explain strategies used in problem-solving, and relate them to computer programming.
4.2.2 Define the term "algorithm," and explain how it relates to problem-solving.
4.2.3 Explain the three types of programming errors (i.e., logic, syntax, runtime), and describe the forms of testing that can be used to locate and debug errors.
4.2.4 Solve a problem using logic by planning a strategy, designing and testing a hypothesis, and/or creating a set of step-by-step instructions to perform a task.
Subdomain 4.3 **Demonstrate knowledge of fundamental structured programming concepts.**
4.3.1 Define "structured programming," and discuss the advantages of this approach. 4.3.2 Define the three main programming control structures used in structured programming: sequential, selection (decision), and iteration (loops). 4.3.3 Describe iterative programming structures (e.g., while, do/while, etc.) and how they are used in programming. 4.3.4 Describe selection programming structures (e.g., if/then, else) and explain the logic used for if statements. 4.3.5 Write a simple program in pseudo-code that uses structured programming to solve a problem.

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Subdomain 4.4 **Demonstrate proficiency in basic programming and working with data.**
4.4.1 Explain the types and uses of variables in programming. 4.4.2 Explain basic object-oriented concepts. 4.4.3 Describe fundamental Boolean concepts, including Boolean algebra, operators, logic. 4.4.4 Create animated objects using a high-level programming environment (e.g., Alice, Greenfoot) to control their behavior. 4.4.5 Create a simple program that uses animated objects.
4.4.6 Convert a simple program from pseudo-code into a common high-level programming environment (e.g., Alice, Greenfoot). 4.4.7 Create a simple program using a high-level programming environment (e.g., Alice, Greenfoot).
4.4.8 Troubleshoot and debug errors in code.