



Palestine Polytechnic University
College of Engineering
Department of Civil Engineering and Architecture
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Action Research

"Trouble in understanding loop control structure in computer programming C++"

Prepared by: Muna Al-Hanini

Step1: Problem

After completing this course students should be able to:

- 1) Explain loop control structure
- 2) Design loop
- 3) Implement loop

So from Exam, Quizzes and homework there are problems faced in using loops properly, design and implementing loops (initial value, loop parameters, condition, stopping, update statement..) and tracing loops.

Step 2: Plan of Action

Using new method of teaching which is **Puzzle-Based Learning (PZBL)**. This method aims to teach students critical thinking and problem solving techniques.

This techniques uses divide and conquer strategy, where student supposed to divide the problem statement into small pieces and after writing line of code for each piece they have to arrange them in a correct order.

In computer programming courses, the process of puzzle solving is conducted in a few steps. Firstly, the problem is presented to the student according to content that is being taught. A complete program solution is then divided into number of program puzzle pieces depending on the desired difficulty. Minimum size for a puzzle piece is one complete line of code. Student then attempts to reconstruct the program, by selecting the correct program pieces in the correct order, after which his success is evaluated. This procedure can be guided by a teacher.

Puzzle –method

Write a program, containing constructs, in which students make mistakes;

Then divide the program into parts, sticking to the following rules:

- one word cannot be divided;
- parts are to be combined uniquely;
- Confuse the parts.

- **Example:** find the maximum number between two integers you enter???

```

Puzzle: example

{ //begin of the main
int a,b,;

    cout<< "Enter two numbers" ;
    cin >> a >> b;
    cout<< "the maximum number between a and b is ";
    while (a!=b)
    { //begin of while loop
        if (a>b)
        cout<< a;
        else
        cout<< b;
    } //end of while
} // end of main

```

```

Puzzle: example

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int a,b,;

    cout<< "Enter two numbers" ;
    cin >> a >> b;
    cout<< "the maximum number between a and b is ";
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```

Puzzle: example

    cout<< "Enter two numbers" ;
    cin >> a >> b;
    cout<< "the maximum number between a and b is ";
    { //begin of while loop
        if (a>b)
        while (a!=b)
int a,b,;

    } //end of while
} // end of main

    cout<< a;
    else
    cout<< b;
{ //begin of the main

```

- *Another example:*

Puzzle: example
for loop is used to print numbers from 1-100 numbers using C++ language

```
for( int i =1; i<=100; i++)  
  
{ // begin for loop body  
  cout<< i << " ";  
}  
// end for loop
```

Puzzle: example
for loop is used to print numbers from 1-100 numbers using C++ language

```
for( int i =1; i<=100; i++)  
  
{ // begin for loop body  
  cout<< i << " ";  
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Puzzle: example
for loop is used to print numbers from 1-100 numbers using C++ language

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for( int i =1; i<=100; i++)  
  
{ // begin for loop body  
  
}  
// end for loop  
cout<< i << " ";
```

- Same procedure can be applied to for loop, while loop and do-while loop.
- In this way we can teach all programming concepts to students in an interactive way so that it will not become burden for them.

Step 3: Data Collection / Action

Quiz, exam, assignment, Homework.

Step 4: Assess

- Exam grades.
- Quiz grades.
- Homework grades.

Step 5: Evaluate

Compare the grades before using Puzzle-Based Learning (PZBL) and after using the method.

Step 6: Future Action

- Combine games with learning by using code.org site.
- Give students more examples and discussed it.
- Show more videos about loops.