

¹ Teaching and Digital Innovation in Disciplines Related to
² Information Science and Technology in Upper Secondary Schools
³ in Italy

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7 Abstract

8 This contribution addresses the issues of teaching disciplines related to information science
9 and technology using digital innovation and the appropriate tools to make students better
10 learn coding and computational thinking before, during, and after the pandemic. In
11 particular, I present some teaching experiences related to the previously mentioned topics;
12 these experiences synthesize the different activities carried out in the different school years.

Index terms— information technology; coding; educational innovation; computational thinking; digital resources; teaching.

¹⁶ 1 Introduction

17 digital technologies are increasingly present in our lives, both in work activities and in our personal and
18 relational activities. They play a growing and increasingly important role in teaching and, in general in the
19 proper functioning of the school. The use of digital technologies at school will be increasingly important and
20 necessary. These technologies help teachers to make teaching more attractive, effective, and consistent with
21 the expectations of new generations of students. It is essential that teachers need to use the latest digital
22 resources to organize teaching flexibly, personalizing the training paths of each student even outside the traditional
23 times and spaces of the school. The use of IT tools for teaching of technological-technical disciplines, and
24 specifically in the IT discipline, is fundamental right from the first classes in which the topics most covered are
25 precisely the basics of information technology, and the study and use of software of word processing, spreadsheets
26 and multimedia presentations. For the 1 IIS Carafa Giustiniani Istituto di Istruzione Superiore di indirizzo
27 Artistico, Economico, Musicale, Tecnologico, Professionale -Cerreto Sannita -San Salvatore Telesino -Benevento
28 -<https://www.carafagius tiniani.edu.it/> 2 Istituto Tecnico Industriale "Giambattista Bosco Lucarelli" -Benevento
29 -<https://www.itilucarelli.edu.it/> teaching of programming and coding is essential to enable students to become
30 digital programmers using computational thinking. For the disciplines related to information technology, it was
31 certainly easy to assign tasks to be carried out, deliver project activities, questionnaires, and online checks, as
32 well as self-study from textbooks and teaching materials provided by the teacher, because these are activities
33 carried out even in non-emergency periods.

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36 The use of digital technologies at school, if used correctly within learning processes, is a formidable resource
37 for teachers. It will be increasingly important and necessary to use them to avoid losing contact with the new
38 generations of students because they help teachers to create a more attractive, practical and coherent teaching.
39 Information and communication technologies at school become learning tools aimed at developing skills. If
40 combined with laboratory-type teaching approaches and, or cooperative learning strategies, they contribute
41 to activating forms of learning. The use of innovative tools in the disciplines of the IT sector is essential.
42 Teaching programming and coding is very important in enabling students to become digital programmers using
43 computational thinking. IT teachers produce educational material in an innovative form and possibly use virtual

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44 classrooms to better understand the functions of the various software used in IT disciplines. These methodologies
45 have been used above all in this historical moment of emergency which has forced the world of school to transform
46 itself to allow students to continue to use the school service even if in distance learning mode, be it synchronous
47 or asynchronous.

48 The main specific programming software used by IT teachers are as follows: IDLE Python GUI, Geany,
49 Notepad++, XAMPP, NetBeans, Eclipse, and DevC++ linked to the programming languages addressed: C++,
50 Python, Java, PHP, and mySQL. Other specific software used for teaching are: phpMyAdmin for the study of
51 databases and PHP, CISCO Packet Tracer for Computer network emulation, DevC++ for developing applications
52 in C and C++ and Eclipse for applications in Java. Some of these tools and tools used will be shown below.
53 The first applications presented are those used by all teachers of the school, namely those of the Google Suite for
54 Education package and specifically here are the screens of Google Drive, Documents, Forms (Figure 1 -Google
1 2 Classroom screens), and Google Classroom (Figure 2 -Google Drive, Docs, Forms).

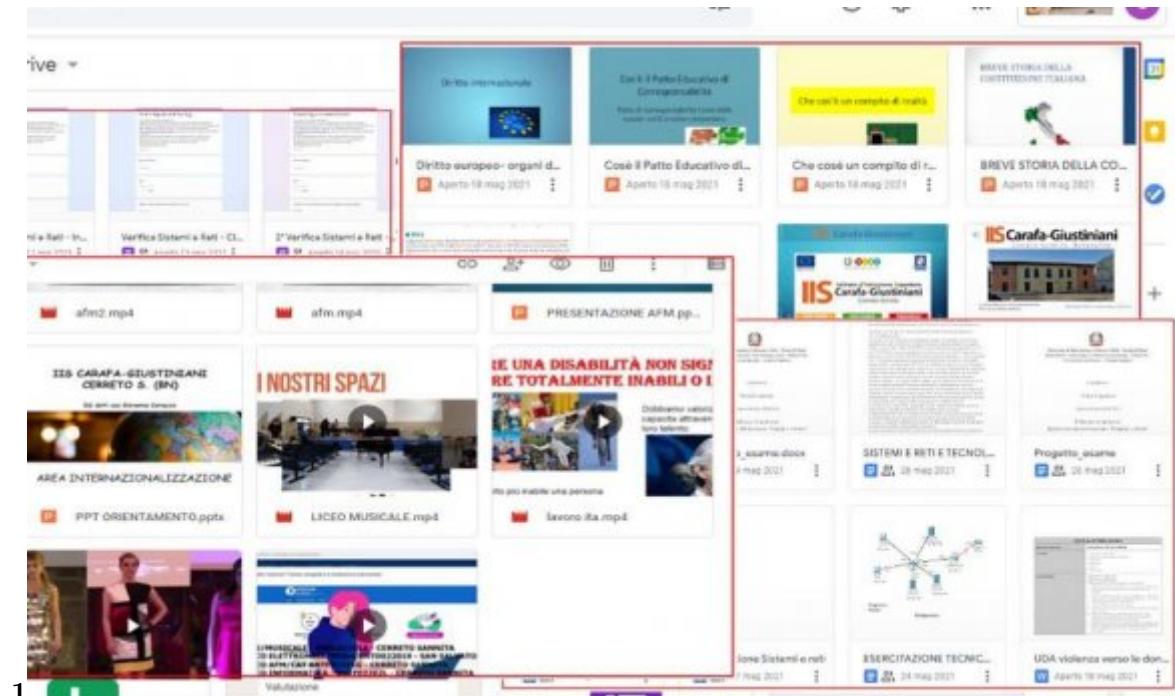


Figure 1: Figure 1 :

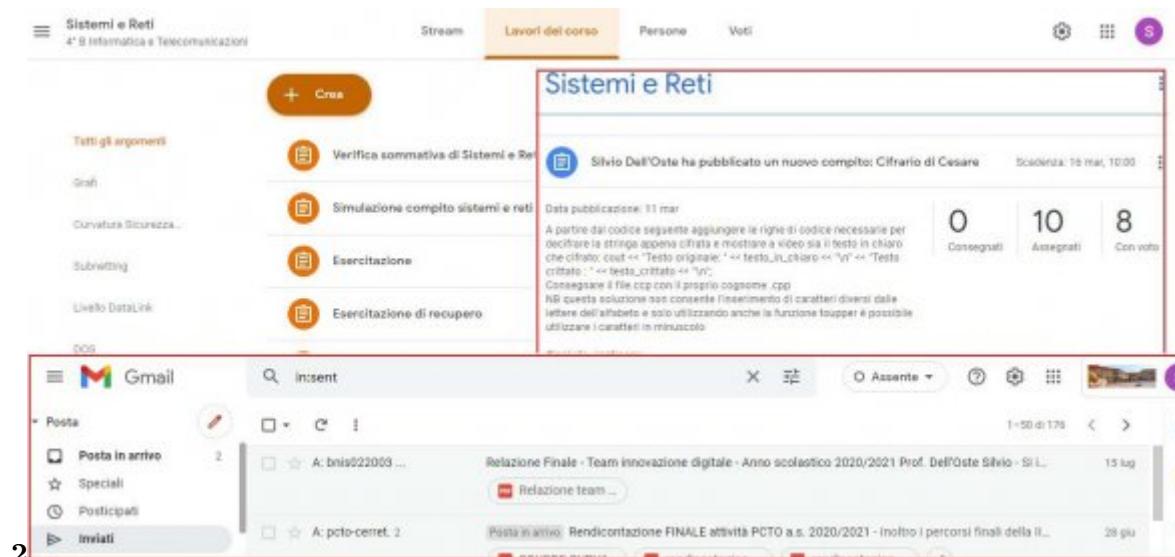


Figure 2: Figure 2 :

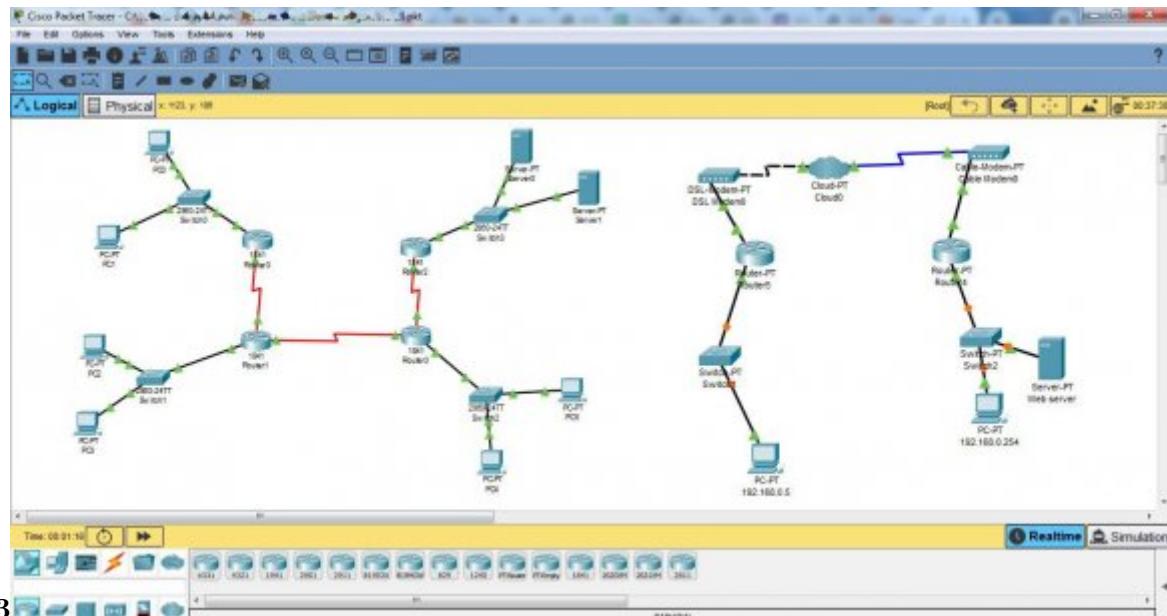


Figure 3: Figure 3 :

phpMyAdmin

Server: 127.0.0.1 > Database: test > Tabella: users

Mostra Struttura SQL Cerca Inserisci E

MySQL ha restituito un insieme vuoto

SELECT * FROM `users`

| | id | username | password |
|--|----|----------|----------|
| | | | |

Inserimento PHP

Nick:

Password:

Ruolo:

premi invio cancella

Operazioni sui risultati della query

Crea vista

Aggiungi ai preferiti questa query

Torna al login

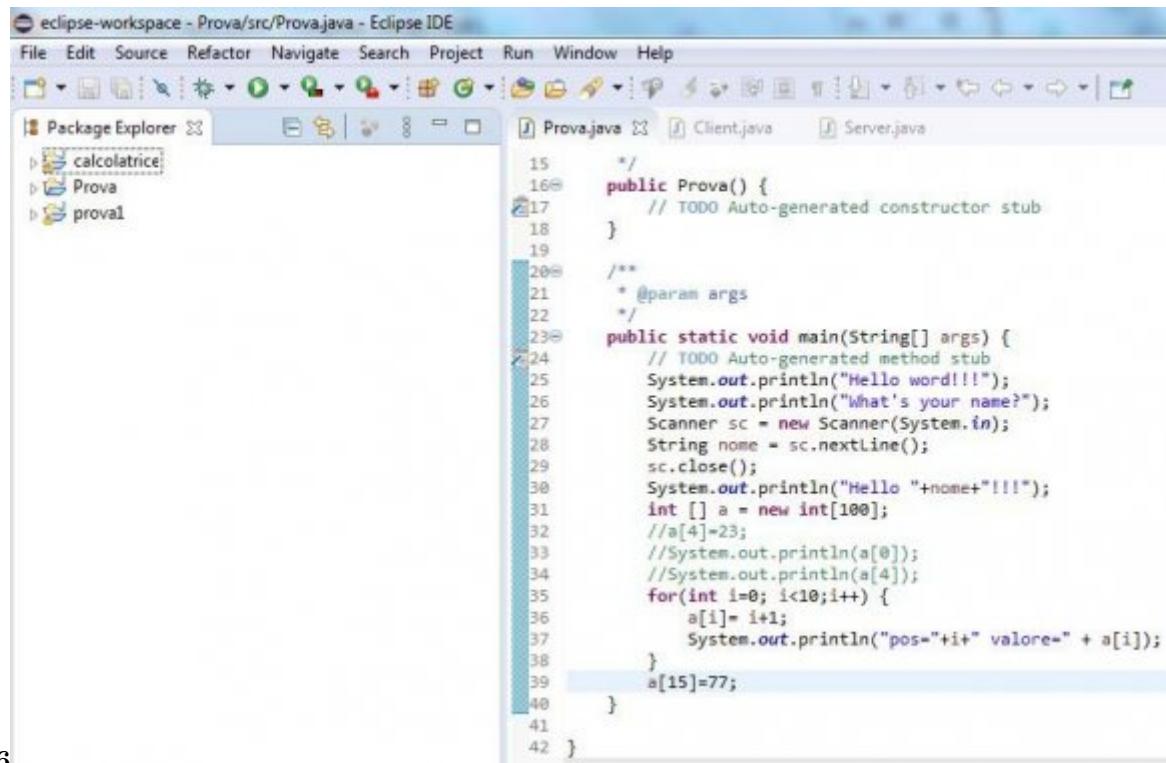
Etichetta: Permetti ad ogni utente di accedere

Nuovo information_schema mysql performance_schema phpmyadmin test Nuova users Campi Nuovo id (PRI, int) password (varchar) username (UNI, varchar) Indici

45

Figure 4: Figure 4 :Figure 5 :

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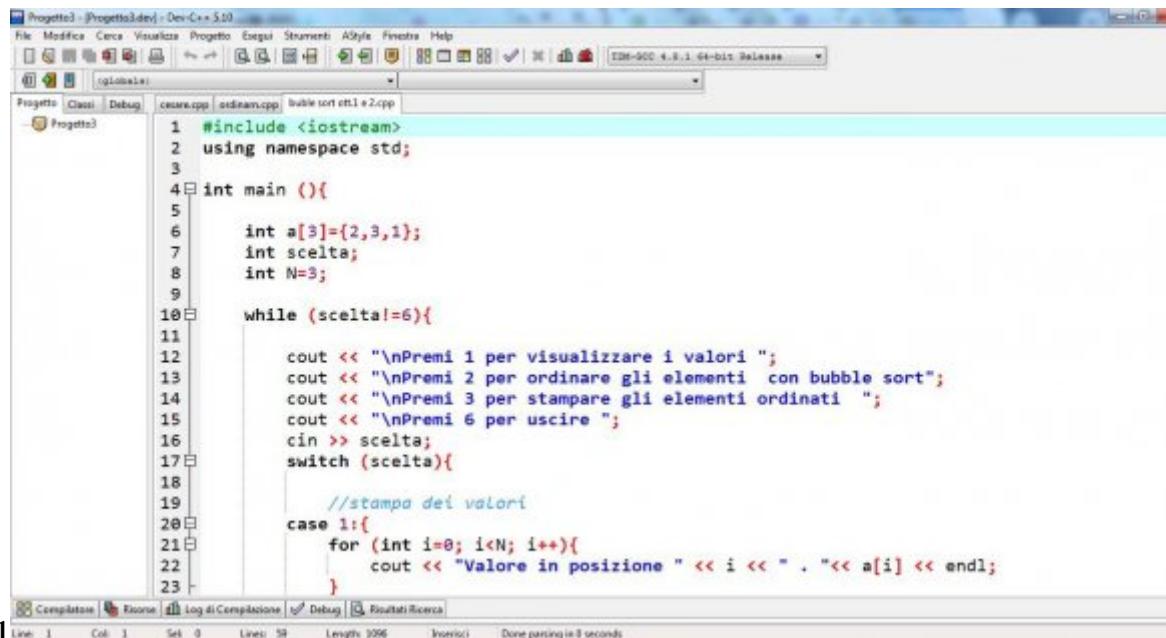


The screenshot shows the Eclipse IDE interface with the title bar "eclipse-workspace - Prova/src/Prova.java - Eclipse IDE". The menu bar includes File, Edit, Source, Refactor, Navigate, Search, Project, Run, Window, Help. The toolbar has various icons for file operations. The left sidebar shows the "Package Explorer" with projects: calcolatrice, Prova, and prova1. The main editor window displays the Java code for "Prova.java". The code includes a constructor "Prova()", a main method that prints "Hello word!!!", asks for a name, and then prints "Hello <name>!!!". It also contains a loop that initializes an array "a" of size 100, sets a[4] to 23, and then prints the array elements. The code ends with "a[15]=77;".

```
15  */
16  public Prova() {
17      // TODO Auto-generated constructor stub
18  }
19
20 /**
21  * @param args
22  */
23 public static void main(String[] args) {
24     // TODO Auto-generated method stub
25     System.out.println("Hello word!!!");
26     System.out.println("What's your name?");
27     Scanner sc = new Scanner(System.in);
28     String nome = sc.nextLine();
29     sc.close();
30     System.out.println("Hello " + nome + "!!!");
31     int [] a = new int[100];
32     //a[4]=23;
33     //System.out.println(a[0]);
34     //System.out.println(a[4]);
35     for(int i=0; i<10; i++) {
36         a[i]= i+1;
37         System.out.println("pos=" + i + " valore=" + a[i]);
38     }
39     a[15]=77;
40 }
41
42 }
```

6

Figure 5: Figure 6 :



The screenshot shows the Dev-C++ IDE interface with the title bar "Progetto3 - [Progetto3\dev] - Dev-C++ 5.10". The menu bar includes File, Modifica, Cerca, Visualizza, Progetto, Esegui, Strumenti, AStyle, Finestra, Help. The toolbar has various icons for file operations. The left sidebar shows the "Progetto" view with files: bubble sort c1.2.cpp. The main editor window displays the C++ code for "bubble sort c1.2.cpp". The code includes an array "a" of size 3 with values 2, 3, 1. It then enters a loop where it prints menu options (1-6), takes user input for "scelta", and then prints the array elements. The code ends with a switch statement for "scelta" case 1, which prints the array elements.

```
1 #include <iostream>
2 using namespace std;
3
4 int main (){
5
6     int a[3]={2,3,1};
7     int scelta;
8     int N=3;
9
10    while (scelta!=6){
11
12        cout << "\nPremi 1 per visualizzare i valori ";
13        cout << "\nPremi 2 per ordinare gli elementi con bubble sort";
14        cout << "\nPremi 3 per stampare gli elementi ordinati ";
15        cout << "\nPremi 6 per uscire ";
16        cin >> scelta;
17        switch (scelta){
18
19            //stampa dei valori
20            case 1:{
21                for (int i=0; i<N; i++){
22                    cout << "Valore in posizione " << i << " . " << a[i] << endl;
23            }
24        }
25    }
26 }
```

1

Figure 6: Bibliography 1 .

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Figure 7:

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