Original Article

INTEGRATION OF INTERDISCIPLINARY RELATIONS IN TRAINING IS THE BASIS OF THE PROCESS

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Abstract

For the sake of development of modern sciences, there has been a tendency in education to make use of integration processes between sciences. Interdisciplinary integration and coordination is one of the characteristic features of the learning process which is an interconnected and fully integrated discipline. Creating interdisciplinary integration, focusing on strengthening student knowledge and skills, teaching Computer Science in relationship with other disciplines, such as mathematics, physics, biology and others, is an area of interest. This method of teaching requires instructors to be fluent not only in their own discipline, but also in other disciplines.

The method of interdisciplinary relationship can be widely used in the teaching of Computer Science in relation to the course of Physics, and this opportunity is one of the actual problems. For the purpose of fulfilling this task, curriculums of both disciplines have been researched and analyzed. Certain topics from the Physics course are reminded students as a refresh to reinforce the knowledge once again, and then on the basis of this knowledge, Computer Science topics are taught, which helps consciously master the new knowledge and increase cognitive activity of students. In this study, to solve physics problems we have employed the programming language C ++, which is a universal language with a wide range of capabilities.

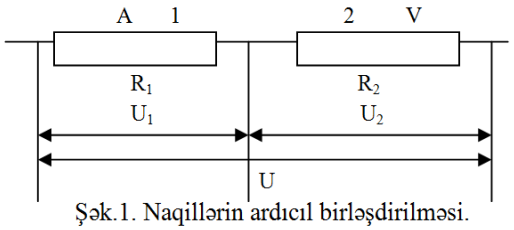
This article justifies actuality of the issue, gives background on the existing work, and presents goals and tasks of this research, as well as methodological basics, scientific novelty, and theoretical and practical importance of this work. Experiments have been conducted with the key points emerging from the context have been presented in the conclusion section.

In conclusion, one of the ways to improve the teaching of Computer Science is the use of interdisciplinary relationships in the educational process. These interdisciplinary relationships play an important role for students in acquisition of scientific, theoretical and practical knowledge and skills. These relationships can be a prerequisite for a comprehensive approach to education.

Keywords: Interdisciplinarity, integration, serial connection, parallel connection, array.

As an example of interdisciplinary relations, let us demonstrate the connection of the "Algorithms and programs related to the processing of arrays" subject of informatics from the physics course to the "Electrodynamics" section of the constant current laws section with the "Serial and parallel connection of wires" topic. Ţo this end, let's first show the following simple scheme for connecting wires in series:

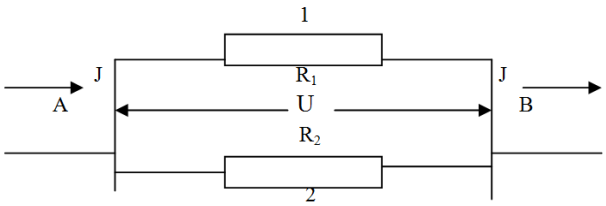
(Fig. 1. Serial connection of wires)



Şək.1. Naqillərin ardıcıl birləşdirilməsi.

Recall that the total resistance during series connection is calculated as R=R1+R2. Next, let's show the following simple scheme for connecting wires in parallel:

(Fig. 1. Parallel connection of wires)



Şək.1. Naqillərin paralel birləşdirilməsi.

In the case of connecting wires, the total resistance we remind you that it is calculated by the formula.

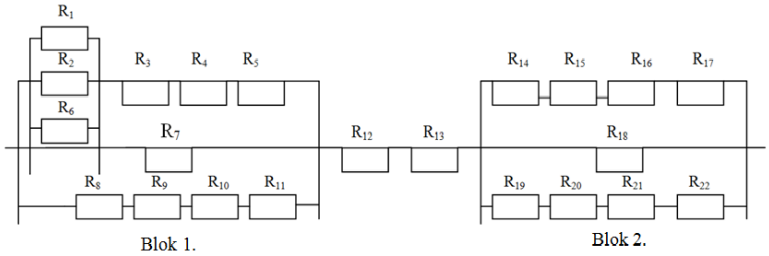
$$\frac{1}{R}=\frac{1}{R_1}+\frac{1}{R_2}$$

Obviously, we can write these formulas for n wires as well.

$$R=R_1+R_2+...+R_n=\sum_{i=1}^{n}R_i \qquad (1)$$
$$\frac{1}{R}=\frac{1}{R_1}+\frac{1}{R_2}+...+\frac{1}{R_n}=\sum_{i=1}^{n}\frac{1}{R_i}$$

Now let's turn to a specific example and assume that the periodic part has the following scheme:

Fig. 2. Parallel connection of wires.



To solve this problem, we compile the following program using arrays:

```
#include <iostream>
using namespace std;
int main()
{const int n=23;
double R[n],SR,SR1,SR2,AR,BR;int i;
// insertion of resistors
for(i=1;i<n;i++)
cin>>R[i];
//blok 1-n insertion of resistors
AR=1/R[1]+1/R[2]+1/R[6];AR=1/AR;
for(i=3;i<=5;i++)
AR=AR+R[i];
BR=0;
for(i=8;i<=11;i++)
BR=BR+R[i];
SR1=1/AR+1/BR+1/R[7];SR1=1/SR1;
//blok 2-nin insertion of resistors
AR=0;
for(i=14;i<=17;i++)
AR=AR+R[i];
BR=0;
for(i=19;i<=22;i++)
BR=BR+R[i];
SR2=1/AR+1/BR+1/R[18];
SR2=1/SR2;
```

```
// the total resistance of the part
SR=SR1+SR2+R[12]+R[13];
cout<<SR<<" om";
return 0;
}
```

It should be noted that in order to keep the compatibility between the text of the program and the scheme, the R[0] element of the resistor array was not taken into account. In general, we believe that the programming tools used in the program created when creating a connection should be compatible with the theoretical knowledge and practical skills of students in the field of programming. In the future, after getting acquainted with the function mechanism of the programming language, it is recommended to use separate functions to calculate the resistance of wires connected in series and wires connected in parallel in the blocks. In fact, by using the text of this problem to apply the function mechanism, a visual relationship is created between the previous structure of the program and the structure in which the function is involved, and this connection can lead to a better understanding of the function mechanism.

Another example of interdisciplinary relations can be seen.

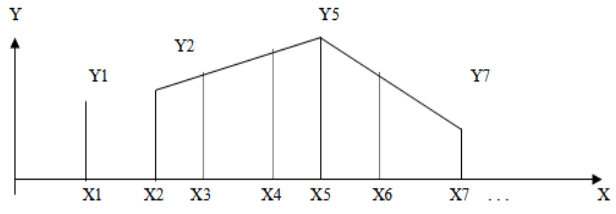
Let's assume that x is the point where the experiment is conducted, and y(x) is the value corresponding to this point. In practice, it may happen that the results obtained at some points during the experiment are lost due to various reasons, and the repetition of the experiment for these points is not considered appropriate due to various objective or subjective reasons. So, the issue is brought to the recovery of lost values on the basis of known values. Let's look at the table below:

Table 1.

x	x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	...	x_n
$Y(x)$	Y_1	Y_2						Y_8	Y_9	Y_{10}		Y_n

The linear interpolation method is used to find the missing values (Fig. 3.).

Fig. 3. Chart for finding missing values.



Let's describe the algorithm of this method:

1. Searching for missing values;

2. If there are no such values, then go to step 6;

3. Construction of a straight line for the missing value;

4. Replacing the price with the price on the straight line; Let's describe the algorithm of this method:

5. If the Yn value is not reached, then go to step 1;

1. Searching for missing values;

6. Issuance of the price table after recovery of missing prices.

2. If there are no such values, then go to step 6;

3. Construction of a straight line for the missing value;

We perform linear interpolation using the equation of the straight line y=px+q passing through the points (x1,y1) and (x2,y2). Here,

4. Replacing the price with the price on the straight line;

5. If the Yn value is not reached, then go to step 1;

6. Issuance of the price table after recovery of missing prices.

We perform linear interpolation using the equation of the straight line y=px+q passing through the points (x1,y1) and (x2,y2). Here,

$$p = \frac{y_2 - y_1}{x_2 - x_1}; \qquad q = \frac{x_2 y_1 - x_1 y_2}{x_2 - x_1}$$

is calculated as. The next program of the given problem is written in C++ language. Thus, we achieved the necessary level of connection with the physics course with the applied connection.

The result

During the research, it became clear once again that when organizing the teaching of the informatics course in connection with other subjects, it is very important to solve examples and studies with students, to describe the solution of those problems in programming language programs, and to implement the solution on a computer and get the results. In this process, on the one hand, students master computer science topics by remembering certain topics in certain subjects and successfully perform the tasks given by the teacher on the computer. The theoretical materials received by the students help them to understand in depth the scientific basis of practical works from informatics, and the practical exercises help them to strengthen and deepen their knowledge from informatics.

Pedagogical experiments were conducted to once again determine the effect of our study on the use of interdisciplinary relations in the teaching of informatics, and as a result, there is a great pole in students having deep and systematic knowledge, as well as increasing the quality of knowledge and forming the ability to apply that knowledge.

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