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DEVELOPMENT OF E-LEARNING MATERIALS

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Annotation

Problems of the developing e-learning materials based on practical approach are considered in this paper. Practical approach is demonstrated by developing learning materials for the text book on Computer Sciences, particularly, programing on C. This approach implies two aspects: introducing new definition, object or structure through considering some practical problem example and elaborating problems reflecting practice application.

Key words: e-learning, C programing, practical approach.

Introduction: e-learning concept

E-learning concept includes:

effective multimedia learning using electronic educational technologies;

deeper learning when words and relevant graphics are both presented instead of words presented alone (also called the multimedia effect);

elements in multimedia presentations are relevant graphics, audio narration, and explanatory text. Combining any two of these three elements works better than using just one or all three.

Effective multimedia learning involves IT educational technologies, including on-line, distance learning as well. Due to this concept education process becomes more accessible for widely croups of learners. It gives more flexibility for them to choose own learning trajectory based on their study progress.

Effective using multimedia allows perform deeper learning based not only on words but on supporting audio and video media as well. Learner gets information about new item through many different views, aspects. In result, he adopts new information easier, stronger, more relevantly and effectively.

Multimedia textbook on programming

Based on e-learning concept above one develop text book "Computer Sciences: Basic programing on C". Book is a basis for the lectures on the course of Computer Sciences for engineering specialties. It reflects authors' pedagogical conception with focusing on engineering-technical approach. Lecture materials are based on the bank of tasks and problems that have practical application in engineering and techniques. The developing learning materials is based on practical approach that implies two aspects: introducing new definition, object or structure through considering some practical problem example and elaborating problems reflecting practice application.

New item in text book starts with the formulation of some practical problem. Selected problem is accompanied by a detailed description of its solution. The algorithm is given in the form of a verbal interpretation of the idea of a solution or by using algorithmic pseudo-code. It gives opportunity to explain solution of the algorithm. Tasks are selected, as mentioned above, taking into account their further practical application. They form the basis of standard algorithms for further use in programming.

Then C code of the program that solves given problem is considered. The program contains a detailed commentary implemented directly in the text of the code. Based on the analysis of the program code, new terms and programming objects are introduced.

Problem example

We illustrate what was said above using the example of a sorting algorithm for a numeric array. Here we'll apply bubble sorting algorithm. Formulation of the problem is presented first.

Problem: sort integer mono dimensional array of size N in increasing order.

We'll solve problem by using bubble sorting algorithm.

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Algorithm consists of *N-1* steps. On each step elements of an array are observed sequentially pair by pair. If some pair is not a "proper" one then elements of that pair are swapped. "Proper" pair is one consisting of two elements of array in increasing order. Not a "proper" pair, inversely, means that elements of pair located in decreasing order.

Current step is finished in case of last pair have checked. Next step repeats checks similarly to previous step. After *N-1* such steps sorted array will be obtained.

During 1ˢᵗ step the 1ˢᵗ maximal element will be placed on the top of array (from the right side). The 1ˢᵗ biggest "bubble"-element is come to the "surface". Then on next step next bubble will float up and so on. It's the reason to name this algorithm by "Bubble" Sort.

Pseudo code of the algorithm:

```
/* Bubble sort with the output of current array in each step */
    input (a - array)
    for (i = 0; i< = n-2; i++)                    /    *
steps */
    { for (j = 0; j <= n-2-i; j++)                /    *
loop to check pairs */
            { check pair (a [j], a[j+1]) for properness and swap
pair elements if necessary
                }
    output (a)
    }                                             /    *
current array*/
    output (a)                                    /    *
sorted array */


    C code:
    /* input original array*/
    #include <stdio.h>
    #define N  10
    int main(void)
    {
    int i, j, x; int a[N];
     /* input array */
    printf ("Initial array:\n");
    for (i=0; i<N; i++)
        {
        printf ("a[%d] = ", i); scanf ("%d", &a[i]);
        }
    for (i = 0; i< = n-2; i++)                     /    *
steps */
```

```
    {
    for (j = 0; j <= n-2-i; j++)                /*    loop    to
check pairs */
            {
            if (a [j] > a[j+1])
                { x = a [j]; a [j] = a[j+1]; a[j+1] = x;
                }
            }
    printf ("Current step's array:\n");
    printf("Loop %d: a = ", i+1);
    for (j=0; j<N; j++)
        {
        printf("%d ", a[j]);
        }
    printf("\n");
    }
/* print sorted array */
printf ("Sorted array:\n");
for (i=0; i<N; i++)
    {
    printf("a[%d] = %d\n", i, a[i]);
    }
return 0;
}
```

Conclusion

Submission of educational material in this form allows the student to assimilate the idea of the algorithm and its implementation in a more efficient way. As a result, the student receives a standard tool in the form of a sorting algorithm. At the same time, the software implementation of the problem solving algorithm, including in-text comments, allows for a deeper study of both the algorithm itself and the capabilities of the program language.

Suggested text book is designated in accordance with the current program of the bachelor course on Computer Sciences in Turin Polytechnic University in Tashkent. It may be used for the students of engineering specialties, teachers on Computer Sciences, Algorithms and Programming of another Higher Education Institutes as well.

References

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