

ASPECTS OF EFFECTIVE USER INTERFACE DESIGN OF DEMONSTRATION ENVIRONMENT COMPONENTS

Maksimovich M.B.

Kherson State University

We analyzed question of the studying course "Basics of algorithmization and programming". We propose to study material by using program demonstration environment. We described the perspectives of effective design of software application in the future.

Keywords: *informatization, information and communication technologies, the program demonstration environment, Videointepretator, user interface, design.*

Вступ

Informatization of education in Ukraine is one of the most important mechanisms of modernization of educational system. Introduction of modern information and communication technology (ICT) to the ways of education will allow to upgrade purpose, content, methods, tools and organizational learning for teachers. Informatization of education is not only the result, but also an incentive for development of ICT, it providing to accelerate socio-economic development of society. We will consider development ways of the process ICT's informatization and implementation to educational process of HEIS which offered by Trius Y.V. and their results, by Spivakovsky A. V. (fig. 1)

Informatization of education is the main condition of the successful development of society's informatization process and ensuring the appropriate resources for priority needs. This is the process of preparing a person to a fulfilling life in the information society [5.9].

Full training activity is possible with providing the intelligent interface that must to provide the main features of the learning environment to user.

Interaction between users and the computer (HCI-Human-Computer Interaction) occurs at the interface. An important facet of HCI is the securing of user satisfaction.

Ease of use and high quality product are important competitive advantages in the labour-market, where most manufacturers to offer roughly the same functionality.

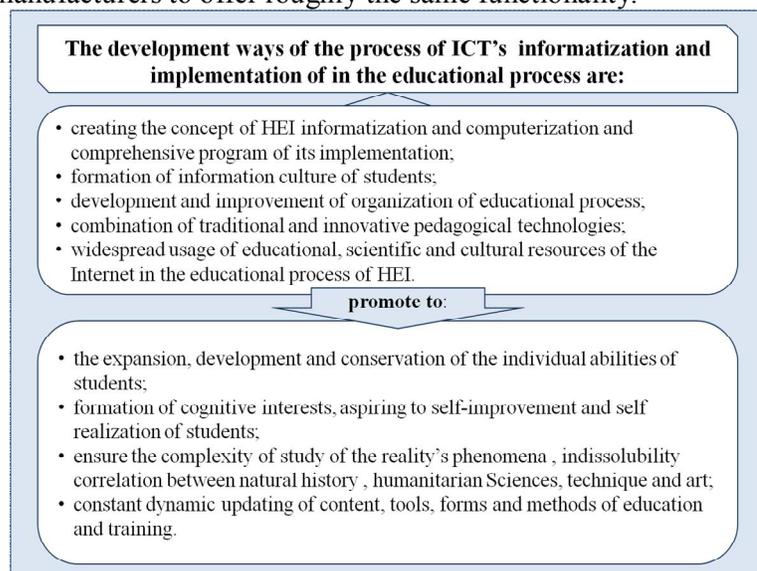


Fig. 1. The development ways of the process of ICT's informatization and implementation of in the educational process of HEI and their consequences

Definition of usability is in the standard ISO 9241-11. Generally, usability is a convenience and ease of use of some of the product for its customers, as well as ways to provide this convenience. In addition to the word "usability" there is more known in the Russian language term "Ergonomics". Usability is a very important criterion not only for Web-Sites, but for different applications. You cannot measure to quantify usability.

The currency of this article is determined by the necessity to study aspects of effective interaction between the user and interface with performing professional tasks at the computer. Design the optimal user interface of software allows to labour-subject to resolve assigned task – to execute operations and to achieve the desired result without additional efforts.

Problem definition

Integrated environment of studying course "Basics of algorithmization and programming" WEBOAP is created at Kherson State University. The main advantage of environment is organization of independent work and the current and final control of the students' knowledge. Environment provides for teacher and students all features of effective studying course basics of algorithmization and programming.

In an integrated environment studying course "Basics of algorithmization and programming" we propose to study not only the lexical structures of the programming language, but consider the methods of algorithmization and their wide usage in the resolve of assigned task. Along with studying theoretical material we offer to pursue the computing experiment for studying the complexity and efficiency of algorithms. [3].

Studying the effectiveness of algorithms with computing experiment is produced with using a special "Program demonstration environment" (fig. 2).

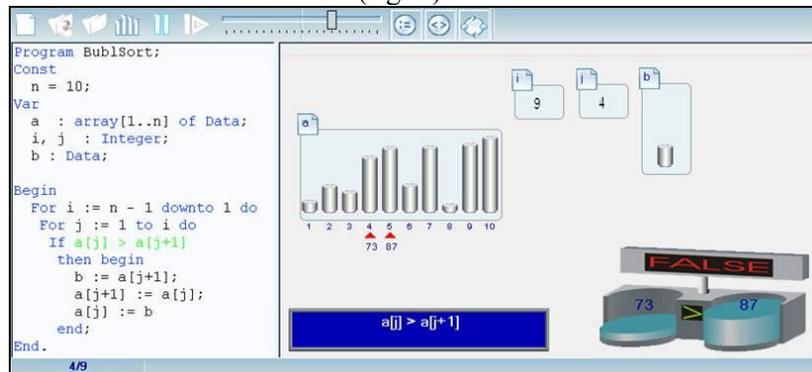


Fig. 2. «Середовище демонстрації»

This work is the logical continuation of the development of pedagogical-oriented systems to support the practical activities that are developed by the Research Institute of informational technologies of Kherson State University. It is based on the program-methodical complex «Videointerpreter of searching and sorting algorithms [1, 2].

Basic material

New version of the demonstration environment "Videointerpreter 3.0" is developed with using advanced technology at the moment. Requirements to the program in general are:

- cross-platform;
- versatility;
- interactivity;
- UI-friendliness;
- code reuse;
- interface interaction standardization;
- working with programming language Pascal, C, Java;

Design the algorithm takes place in 3 stages:

- create text algorithm on one of the supported programming languages;
- data generation algorithm for global arrays and adding them to the collection;
- assigning data to the global arrays from generated collection.

Creating text of algorithm may be provided by one of four variants:

- writing text of algorithm in the built-in code editor;
- selection of algorithm from collection systems;
- selection file of algorithm on the local computer;
- downloading a file from personal on-line store.

After the user has finished creating text of algorithm, he should click "Build". The next step will be the parsing program and creating an abstract syntax tree or receiving error in the case of failure. Right side will display the data generation in case the syntax correct text of algorithm.

The data generation panel is divided into three blocks:

1. Generating block of array includes the following distribution according to template:
 - ascending;
 - descending;
 - an array with one extreme point;
 - an array with two extreme points;
 - an array of the same items;
 - an array of random values distributed by normal law.

2. Display block of global program variables. All types except array can be initialized in the text box near to the name of the variable:

- array Data type;
- Boolean variables;
- integer variables;
- string variables.

The Data type is defined:

- comparison operation $<$, $<=$, $>$, $>=$, to $= < >$
- assignment operator: $=$ (copy operation).

3. Data collection block required to display and to perform operations on sets of data for global arrays: to add them to the specific variables in the list of global variables, to delete the generated set of the collection, to display a filtered list of data sets.

The new version will provide an opportunity to perform the following functions:

- In functionality terms:
 - selection of multiple algorithms, editing them in the one session;
 - generating arrays for various types of distribution;
 - syntax highlighting;
 - highlighting execute designs;
 - checking the correctness of the position of the brackets;
 - IntelliSense;
 - writing comments to the code;
 - ability to see the value of the instance variables and their values;
 - availability of features to disable animation;
 - updating plug-ins.
- In ease terms:
 - creating the navigation between the algorithms in the code editor;
 - sequential transition from data visualization to the formation;
 - addressing blocks of code;
 - classification algorithms for topics with choosing from the collection;
 - ability to run multiple sessions in the algorithms.

“Videointerpreter 3.0” includes the following main components: the code editor, the renderer, the statistics section. One of the components is applications environment management module Plug-in Manager.

Code Editor is used to implement a specific algorithm on programming language in the process of writing code or scripts. Encoding is part of the programming, along with analysis,

design, compiling, testing and debugging. A user writes arbitrary algorithm by Pascal language (C, Java) with Data type or selects algorithms suggested by the system.

Renderer is visual component that implements the functionality of the display, algorithm's animation and control the software object. *Renderer* displays the process of implementation of this algorithm, visually interpreting operations on the Data type, the value of the index expressions, logical and integer variables. As a result, the user sees the implementation of the algorithm. He can edit text algorithm and see the changes in the performance of the algorithm immediately.

Statistics section applied to display data curve which demonstrate the algorithms, their effectiveness.

Graphical display:

- run-time depending on the items' number;
- number of comparisons of the items' number;
- number of permutations on the items' number.

Export data anticipated (transfer of graphics and tables) in the following formats: PDF, Txt, Xls, Xlsx, Rtf.

Plug-in Manager provides the ability to manage apps environment, each of which has the properties (name, version, author, creation date, description). The module displays:

- current (installed) plug-in;
- available plug-ins that you can use;
- new plug-ins that you need to download.

In new version we will reconstruct the user interface according to the basic principles of designing the interface. We consider the basic guidelines for constructing the user interface [7, 8]:

- The naturalness of the interface is the interface that does not require the user to significantly change traditional ways to resolve problem. In our case it means that the software provides an intuitive interface for working with modules.

- UI consistency. The same command must perform the same function. That is a visual representation of the environment's elements will be clear to everyone else. For example, the functions in the code editor with text (copy, cut, paste) are the same as in normal text editor.

- UI-friendliness. At every stage of the interface should allow only the appropriate set of actions and warn users about the situation, where they can harm the system or data. Interface environment will provide an opportunity to cancel or correct executed actions.

- Feedback. Every user's action should receive a visual, sound confirmation that software perceived the entered command. The software will react to the user's action that is done, it accompanied by visualization or transfer to condition according to the functionality.

- The simplicity of the interface is not simplification, it is ensuring of ease in its studying and usage. In addition, it must provide access to the entire list of the functionality which provided by the software product. That is the presentation in the environment will be presented with the logical correlation.

- The flexibility of the interface is its ability to take into account the user's level of training and productivity. The flexibility to change the structure of dialogue suggests and input data. For example, when generating an array of the user has to select the type of generation, the number of elements in the array.

- Aesthetic appeal is the correct visual representation of used objects that provides transfer of enough sensitive information about the behavior and interaction of different objects. In the meantime, we must remember that each visual element that appears on the screen that requires user's attention is not unlimited.

Effective interface should be obvious; therefore, necessary that user understand without additional effort the range of its features to follow up maximum of work, it must require the minimum of information from the user. The developers of the software product "Videointerpreter 3.0" are designing the intuitive interface. The ability to access all the information and components, and the ability to undo action are given for user to achieve this goal. We taken into consideration all

aspects of effectively designing the user interface, when working on a new version of the environment

Conclusion

The user interface is the part of the software product that is stand before the eyes. Some programmers tend to leave design to the end and they believe that the real benefit of application is the programming code that requires more attention. However, most software is hard to use. This conclusion follows from most results of the testing facilities, the practical observation and planners' personal experience of software. Actually, the user interface is a channel which to make interaction between the user and the program.

So the reconstruction of the user interface in the new version will correspond to the basic principles of designing the interface. As a result of the work will be created:

- usability code editor;
- improved renderer;
- additional statistics section.

The scope of dissemination of computer, and the growing intensification of human labor are demanded more attention to design interfaces for reducing discomfort when user working with the software product.

The design of the interface should be iterative character his mandatory element should be negotiation with a potential user and the obtained results. Tools and implementing methods of the interface must to provide the ability to adapt it to the needs and characteristics of the user.

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