

# **DEVELOPMENT OF VIRTUAL LABORATORY EXPERIMENTS IN ILABS ENVIRONMENT**

*Ostroukh A.V., Nikolaev A.B.*

Moscow Automobile and Road construction State Technical University

Moscow, Russia

## **Introduction**

The trend of development of virtual laboratory complexes suggests the appearance of software that could be adjusted to suit the requirements of different subject areas.

As applied to technical education the concept of virtual educational laboratory (VEL) is potentially focused on the realization of the above requirements for the computerization of engineering training, complies with ideas of open and remote education, and allows, at least partially, to smoothen the acuity of the currently existing problems of material support of educational process [1 - 6].

## **Web-laboratories with remote access**

When working with educational system, providing a developed practical component (for example, a considered real experiment) with the active use of a personal computer, it is appropriate to use the concept of a virtual laboratory, or a shared laboratory in case it is considered to be used by several students simultaneously.

Of particular interest are web-laboratories with remote access. These are realized by modification of software of a lab with one laboratory server. In this case, students get access to the equipment from any personal computer connected to Internet. To start working it is usually necessary: to register at the laboratory's website; to download methodological support, to download the client application.

The structure of a web-laboratory with remote access is shown on Figure 1 [2,3].

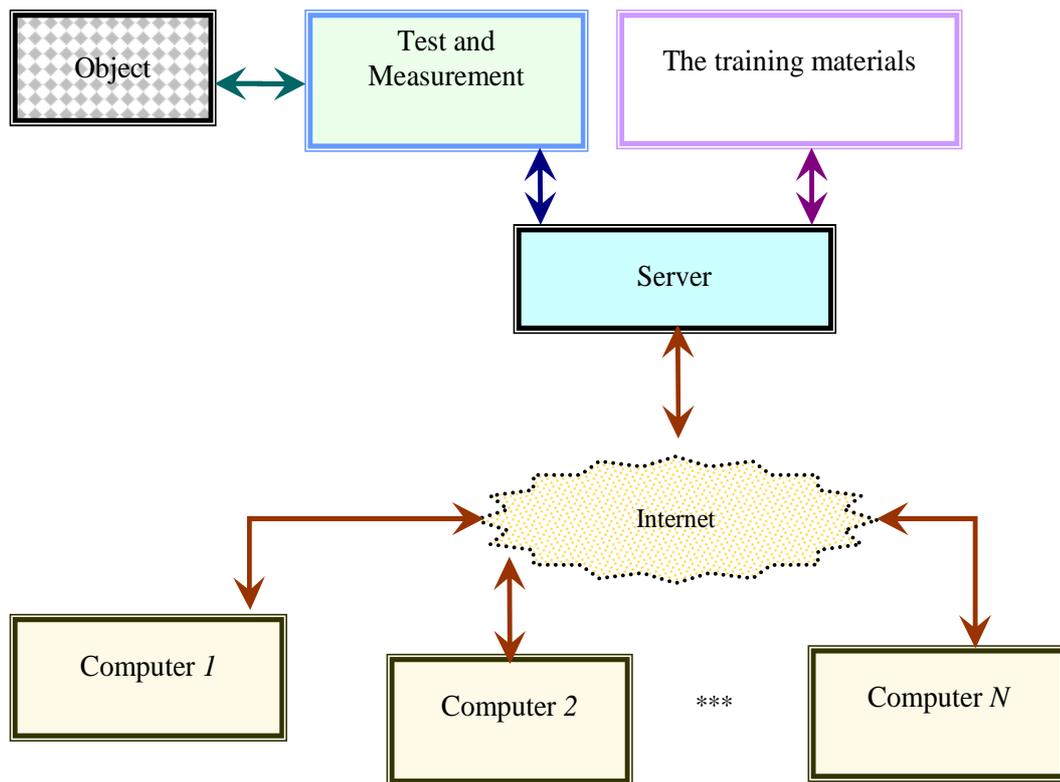


Figure 1 - Web-laboratory with remote access structure

### **Hardware and software tools for creation of virtual lab experiments**

For the design of systems that use certain equipment, such solutions have restrictions. That is why the virtual tools technology proposed by National Instruments company stands out in the category of development tools [3,6].

The use of virtual tools technology makes it possible to create a unified set of program modules for shared laboratories, which gives an opportunity of flexible adjustment at each workplace. Hardware and software core from National Instruments, used as the basis of measuring component of the lab make it universal in terms of physical connection of objects of study of various subject areas.

As a member of the Global On-Line Laboratories Consortium (GOLC) MADI has access to the worldwide repository of virtual laboratory experiments Lab2go. Created virtual laboratory experiments must have access to real laboratory equipment, have an opportunity of combining with research software packages and specialized databases for engineering disciplines of auto-road complex (for use in the

educational process in MADI), and be represented in the global repository of virtual laboratory experiments lab2go.

## References

- [1] Ostroukh A.V. Experience in developing e-learning resources for a new generation of distance learning technology // In the World of Scientific Discoveries. - 2011. - № 9 (21). - P. 149-158
- [2] Ostroukh A.V., Surkova N.E. E-learning resources in professional education (Monograph) // Saarbrucken, Germany: LAP LAMBERT Academic Publishing. - 2011. – 184 p. - ISBN 978-3-8433-2216-4.
- [3] Ostroukh A.V., Krasnyanskiy M.N., Barinov K.A., Dedov D.L., Rudnev A.A. Virtual simulator systems for education and training of personnel of chemical and engineering industries // Vestnik TGTU. - 2011. - V.17. - № 2. - P.497-501
- [4] Ostroukh A.V. Churin V.V., Podberiozkin A.A. The use of computer simulators for the training of workers of road construction trades // Molodoy Ucheniy. - 2011. - № 4 (27). - P. 28-29.
- [5] Ostroukh A.V., Barinov K.A., Krasnyanskiy M.N., Malamut A.J. Algorithm of Virtual Training Complex Designing for Personnel Retraining on Petrochemical Enterprise // International Journal of Advanced Studies. – 2012. – Vol. 2. - No. 3; <http://ijournal-as.com/issues/2012/3/barinov.pdf> (accessed November 30, 2012)
- [6] Ostroukh A.V., Krasnyanskiy M.N., Nikolaev A.B. Application of Virtual Simulators for Training Students in the Field of Chemical Engineering and Professional Improvement of Petrochemical Enterprises Personnel // International Journal of Advanced Studies. – 2012. – Vol. 2. - No. 3; <http://ijournal-as.com/issues/2012/3/krasnyansky.pdf> (accessed November 30, 2012)