

## VIRTUAL INFORMATIONAL SPACE: NEW TOOLS FOR MATERIAL SCIENCE RESEARCH AND STUDENTS' TRAINING

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The report is devoted to pedagogical computer technologies and database courses in MS implementation in education process at the NTUU "KPI" Metal Physics Department (MPD). This is the example of ICT in MS training of MPD students applications in modern technical university and our first experience in this direction. To provide this educational MPD's Programs for future MS engineers are based on intensive training in ICT subjects.

According to the conception of continuous computer students training in MPD speciality "Physical Material Science" the following principles are to be realized: 1. Study of informatics and in information and communication technologies (ICT) in frames of cycles scientific and natural disciplines; 2. Teaching of disciplines of engineering in which informatics concerning a concrete sphere of specialization of future engineers is considered; 3. Development of skills and habits of ICT using for problems, tasks in subject fields in professional-practical training disciplines study solving; 4. Development of software user's skills and habits in research.

Department's PC network also helps to improve the quality of education in MS field. To help students in their studies and research MPD provides informational and methodological support trough web-page <http://www.ntu-kpi.kiev.ua/iff/kpm/>) and through Department's local network "Phys Met Net". All information related to research and education is forming MPD Library of Electronic Resources. Students can get general information about educational process, access electronic versions of teaching materials, browse monographs and papers, work with multimedia text-book, distant courses, PC models & simulations. MPD electronic library contains up-to-date information on international cooperation, links to WWW resources in MS. Internet access from the MPD local network help students to obtain newest data on their research, contact each other and teachers on-line and discuss scientific and organizational problems at MPD forum, participate in international communities and on-line projects. Every student and teacher has his own workspace. Teachers' resources include the courses programs, rating criteria, lectures, questions for exams, PC based labs and applications for training specific skills. As rule students put their homework in their folders and teacher is checking it regularly, leaving the notes and recommendations.

Such organization of information and students-teachers interaction makes educational process very transparent for all its participants. Students are provided with all necessary educational and research information. Teachers can monitor students' progress and support them effectively. Students self work is continuously intensifying. Tests for impartial students knowledge control as well as materials for self work (lists of textbooks, including electronic ones, with the reference to specific pages for every topic's studied), computational and graphical tasks, complex individual tasks for creative skills enhancement (don't "Repeat !" but "Create !") are placed in PhysMetNet. Students become full members of the Department "virtual community" not only in students training but in MPD's research also. Students can take part in reforming, in studying process quality enhancement, they have the direct opportunity to express their propositions, to pay attention to the disadvantages with the help of on-line polls and questionnaire. The main guarantee, that "virtual community" provides – whether the student will get quality insurance knowledge on the discipline studied and habits needed for future profession.

Thanks to the virtual information area created by Phys Met Net: 1. The educational process becomes accessible for students from the computer network exhaustively ("transparency" of all teachers activities and methodical maintenance of the subject matters created by them is provided); 2. The possibility of the additional communication between teachers and students (Thematic Forums in Phys Met Net) is provided; 3. The feedback with students for a quality of an educational process organization estimation, for teachers' work students' estimation, for students attraction to Department reforming is carried out.

It allows for our graduates to acquire – in parallel with traditional for engineers – skills and experience in the interdisciplinary areas such as: 1. To analyse and handle of experimental results by means of the computer tools; 2. To work in computer networks; 3. To use computer simulation techniques of processes in metals and to carry out of computer experiments; 4. The create and to work with databases, using Internet – technologies; 5. To possess of bases in management and marketing of international markets in the field of materials science and high technologies; Thanks to new abilities of ICT now students are being taught such courses as: "Methods of organization of computer experiment in material science", "Computing physics", "Computer modeling of crystal lattice", "Internet-technologies and computer networks in researching activity", "Basics of relational databases for experimental researches and technologies of materials production", "Research results Internet-publishing", "Material science computer classifications ". Students' skills in Internet-resources are highly enhanced, particularly – with databases in Solid State Physics, MDP is integrating step-by-step into international scientific-educational-informational space.

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technical education, on the traditional forms and methods for teaching, ICT change the role and tasks of the teacher's mission in a pedagogical process.

Networking. Nowadays an organization of the MPD research activities is based on using of MPD's laboratories and its international partners facilities as well as on the improvement of virtual laboratories facilities – international scientists teams, that include representatives of our Metal Physics Department (such example – the International project "Virtual International Laboratory in Electron Microscopy for Advanced Materials" for universities-members of Black Sea Universities Network – will be represented in our other report).

Database in MS. In August 2007 NTUU "KPI" MPD students N.Marchenko and A.Oleshkevich were invited to the Tokyo University Summer School "Science of Materials Design", with Prof. Shuichi Iwata as school-master. MPD is deeply grateful to Prof. Sh. Iwata for rendered help. Students A.Oleshkevich and N. Marchenko not only got newest knowledge in "Science of Materials Design" but also acquaint with methods of operating with databases in Solid State Physics during the summer school. Those knowledge are already used in the educational process in MPD.

**Conclusion.** Today ICT are the interdisciplinary integrative and fundamental part in education of MPD students in NTUU "KPI". ICT disciplines became principal subject in material science training and research as new tools for developing skills in these areas.

The experience of the of Metals Physics Department proves that the newest information technologies tools essentially influence on the content of