Введение In the last years, the world has seen a significant increase in the use of new information and communication technologies for educational and professional environments. Nowadays the academic courses in many universities (traditional and open, at distance ones) and the professional environments are using many different kinds of e-learning and m-learning courses, on-line courses in many cases. The same type of methodologies can be used for the common courses in Master degree curricula at the university as well as for updating technical or non-technical skills at companies. In the “traditional” educational systems usually the expository deductive instructional strategy is used: content presentation, examples, sometimes exercises and, rarely task for performance. In these systems the conception of Learning Objects (LO) is common traditional – LO model “presentation, practice, feedback” is a tool in helping deliver information to students. That is, the learning object presents the information, provides the student with an infinite amount of practice (exercises), and provides a test that allows the computer to provide feedback [1]. DIPSEIL system (Distributed Internet-based Performance Support Environment for Individualized Learning) offers the possibility to organize project-based learning, the curriculum is presented by performance of tasks (projects) and the evaluation is based on the developed project. DIPSEIL is an integrated electronic environment accessible and structured to provide individual online access to the full range of information, guidance, advice, data, tools, allowing the user to perform the task with minimal external intervention and assistance in convenient time and place. The purpose of the present paper is to describe our application of an optical-electronic system e-learning course in the one of the basic course of the “Investment Management in Telecommunications” Master program curriculum at Plovdiv University (PU) - “Physical foundations of telecommunications”. We have developed a series of tasks which will allow students to present task solution. B The Master program design: New Master program “Investment Management in Telecommunications” was developed in Plovdiv University [2]. Lecturers and professors from three faculties of the University participated in discussing and development of the Master program curriculum - the Faculty of Physics and Engineering Technology, the Faculty of Philosophy and History and the Faculty of Economics and Social Science. This master's program is designed for students who have obtained Bachelor degree in engineering and physical sciences and economics. Master's program “Investment Management in Telecommunications” prepares students for work in the field of telecommunications, electronic commerce and business connections. The proposed curriculum of this program includes knowledge that managers of corporate or government communications must have, as well as vendors or consultants who are responsible for planning and implementation of broadband and wireless communications to transfer out voice, video or data. It combines the creation and maintenance of communications networks and systems solutions, including management of large annual expenditure for acquisition, installation and maintenance of telecommunication products and services. Students

will have the opportunity to learn specialized elective courses in project management and communications, technology opportunities and perspectives for innovation in telecommunications, introduction to information theory, entrepreneurial finance and venture capital and others. The “Investment Management in Telecommunications degree requires successful completion of 30 credits. The subjects included in the curriculum have the distribution described below: • Eight compulsory subjects; • Two elective courses (students choose from a list containing six subjects); • 50% of subjects are in the field of physics and telecommunications; • 50% - economic and social disciplines. B Students may choose from a wide range of elective courses to develop their interests and complement their career goals. The elective courses are presented below . One of the basic courses in the Master program curriculum is “Physical foundations of telecommunications” course. The Course’s Characteristics The aim of the course "Physical foundations of telecommunications" is to give the students broad knowledge of physics, which will help them understand the physical processes and phenomena used in telecommunications. The educational content of this course is divided into two modules: Mechanics and Thermodynamics, and Electricity, Magnetism and Optics. The first module emphasizes on the basic physical quantities, concepts, laws and phenomena. The concept information as a quantity related to the state of the physical system and the information-entropy interrelation are studied. Basic concepts like impulse, power, work and energy are defined. The second module aims to acquaint the students with the foundations of electromagnetic interactions in nature, and to give them basic knowledge of wave and geometric optics. The basics of Geometric Optics are studied while a special attention is paid to total internal reflection phenomenon which explains the transmittance of the signals along the optical fibers in telecommunication. The main characteristics of electromagnetic waves and phenomena such as interference and diffraction are also discussed. They play an important role in the quality of the transmitted signals and the development of various sensors in telecommunications. Performance-centered E-learning Course The teaching in the “Physical foundations of telecommunications” course is Internet-based and performed in the DIPSEIL system (Distributed Internet-based Performance Support Environment for Individualized Learning) [3]. DIPSEIL offers the possibility to organize project-based learning, the curriculum is presented by performance of tasks (projects) and the evaluation is based on the developed project. DIPSEIL is an integrated electronic environment accessible and structured to provide individual online access to the full range of information, guidance, advice, data, tools, allowing the user to perform the task with minimal external intervention and assistance in convenient time and place. DIPSEIL has two specific characteristics: • The learning content is based on learning tasks. Performance tasks aim preliminary at specified learning outcomes. • There will be no lectures, practicals or final examination. Students only perform the learning tasks throughout the semester and collect credits for each learning tasks they perform adequately. They receive a final mark at the end of the semester based on the

collected credits. The curriculum structure implemented in DIPSEIL system is shown on fig.1. Fig. 1 - Curriculum structure in DIPSEIL DIPSEIL task for performance provides a combination of the following elements: • Task description - the learning tasks is described, explaining the students what is expected of them. • Reference information - task relevant resources support students by making immediately available information, which they either have to study or use just in time to perform the task. • Task-specific training - training materials which help the user to learn while performing the task. • Instructions how to perform the task. • Expert advice about a task - expert advices part contains specific advice on performing tasks. In the DIPSEIL system, students normally build their own courses from all available tasks on the system. This is stored in the database. The basic tasks in “Physical foundations of telecommunications” course are eight. Task 1 – Impulse, Power, Work and Energy. The students must learn and define the basic concepts like impulse, power, work and energy. Task 2 – Microstates, Elementary system. The students must determine the entropy of all microstates in a given volume Task 3 – Probabilities and entropy. The students should apply the Boltzman’s equation for statistical definition of entropy. Task 4 – Entropy and information. The students must study the concept information as a quantity related to the state of the physical system and the information-entropy interrelation. Task 5 – Electromagnetic waves. The students have to define the parameters of a plane electromagnetic wave. Task 6 – Geometric Optics. The students must define the characteristics of light transmittance into one certain optical fiber with cylindrical core. Task 7 – Interference of Light Waves. The students must explain what kind of perturbations take place during the receival of a signal by an aerial due to the interference phenomenon at different environmental conditions. Task 8 – Diffraction of Light Waves. The students must learn and describe the Fresnel diffraction of slits and screens. Example: Task 8 –Diffraction of Light Waves in Dipseil Fig. 2 - Task description Fig. 3 - Task specific training Fig. 4 - Reference information The quick evolution of the computer tools makes a new approach to education unavoidable. In this sense, the DIPSEIL platform appears to be a good approach to obtain results aligned with the increasing needs of Plovdiv University “Paisii Hilendarski” to teach students in different bachelor and master courses. We have presented an introduction to e-learning methodology in “Physical foundations of telecommunications” course that is the basic course in the Master program “Investment Management in Telecommunications” in DIPSEIL education system. Fig. 5 - Instructions how to perform the task The course effectiveness is assessed due to the following criteria: the sequence of learning tasks is well structured; sufficient theoretical information is provided for each of the tasks; sufficient number of examples is provided for each of the tasks; for each of the tasks a procedure how to perform it is provided; the feedback from the instructors is helpful; the feedback from the instructors is just-in-time.