

# MODERN TECHNOLOGY IN LIFELONG LEARNING OF OCCUPATIONAL MEDICINE

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**Abstract.** The introduction of new learning technologies and an increasing usage of the Internet have the potential of changing the image of postgraduate education. A rapid progress in innovative communication systems has led to essential changes in conditions of acquiring knowledge and professional skills. This has resulted in the development of different educational models and the incorporation of computer-assisted education into training programs. In 2002, the School of Public Health at the Nofer Institute of Occupational Medicine has launched first in Poland the introductory course in occupational medicine specialization in the form of distance education. The course was recognized to be equivalent to the traditional face-to-face education. The training process was based on the use of CD-ROM. E-mail was used as the main means of communication to facilitate the exchange between trainers and trainees. Particularly wide interest in distance education among physicians specializing in occupational medicine indicates the need to consider the possibility of introducing consecutive courses, which are required for specialization or for other professional developments in this form of teaching. The purpose of this paper was to discuss the development and implementation of a distance learning course taking into consideration the academic and educational requirements necessary for effective education and training at the post basic level.

**Key words:**

**Occupational medicine training, Distance education, Online education, the Internet in education**

## INTRODUCTION

Health care professionals, in particular physicians, form a professional group that requires continuous education throughout the professional life. It is connected with introducing new knowledge and skills, renewing the knowledge already possessed and its permanent updating, and often with meeting the requirements of successive stages of the professional career. Learners are flooded with an uncontrolled growth of information and knowledge springing up from many more sources than heretofore.

Postgraduate degrees gain in importance in many fields and retraining is necessary in almost all areas. In view of the fast pace of everyday life, it is difficult to cope with additional duties imposed by rules of education. In addition major responsibility for learning, in terms of time and cost, is shifted to employees.

The most obvious implication of this demand for lifelong learning is the need for flexible and not very expensive learning opportunities. Many individuals desperately need distance education courses because they “have jobs, families, civic responsibilities” [1].

Therefore, distance education, which is carried out without drawing away students from everyday professional duties, is a perfect form of professional advancement in case of health care workers.

## DISTANCE EDUCATION

Distance education technologies are expanding at an extremely rapid rate and the most common delivery modes are nowadays audio, video and computer technologies. New educational and training media such as the Internet,

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one and two way video, and other electronic media allow delivery of instruction independently of time and distance, often to populations who otherwise would not benefit from such resources.

With the recent progress of the Internet and other distance technologies, web-based course delivery has become an attractive option for expanding the educational opportunities available to students. Unfortunately, online learning and teaching may encounter some barriers: pedagogical, technical, cultural, psychological or social [2].

Although technology is an integral part of distance education, any successful program must focus on instructional needs of students, rather than on technology itself. It is essential to consider the student's age, cultural and socioeconomic background, interest and experience, educational level and familiarity with distance education methods and delivery systems. The most important actor who can contribute to successful distance learning is a caring, concerned teacher who is confident, experienced, at ease with the equipment, able to use the media creatively and maintain a high level of interactivity with the students [3].

It is essential for training to identify the needs and to plan well designed training for academic, technical, and support staff.

Online learning is an emerging powerhouse of organizational training and education. The benefits of this kind of adult education include:

- reduced education costs (for trainees, not for provider);
- improved administration of training;
- ensured consistency of training on critical competences;
- flexibility and control over pace and content of training;
- customized training;
- convenience of taking courses at any time from any location; e-learning is a learner-driven system.

The most satisfactory outcomes are achieved in model 50/50, where 50 percent online learning is combined with 50 percent of face-to-face education.

However, there are some obstacles for learners participating in online education. Those who have poor study habits, lack of self-discipline or motivation, have been educationally disadvantaged, or are driven almost solely by extrin-

sic reasons for being awarded a degree, tend to find the student-centred pedagogy bewildering, too demanding, or involving too much hard work.

E-learning empowers an individual learner so that the teacher is no longer the gatekeeper of knowledge. It has also reinforced the importance of informal learning and helped to bring about a convergence between learning and working, between learning and communicating, and between learning and entertainment.

### **DISTANCE EDUCATION IN THE SCHOOL OF PUBLIC HEALTH**

The first distance education program was introduced in the Nofer Institute of Occupational Medicine in Łódź in the academic year 2001/2002. It was a distance learning postgraduate study for health care managers provided by the School of Public Health.

The first semester of this form of study was the Internet-based education using CD-ROM. Students had to have access to networked terminals or personal computers whether at work or at home.

In the same period of time the stationary education, covering the same range of topics, continued.

The first semester was ended on the ground of the test carried out at the School of Public Health for two groups of students: one group of students who participated in distance education and the other composed of students who followed traditional face-to-face education. Both groups completed the same test.

The second semester of the studies comprised ten two-day sessions only in traditional, face-to-face mode.

During two consecutive academic years, the postgraduate study for health care managers continued to offer simultaneous courses in a traditional lecture/discussion format, and a web-enhanced format.

Having compared the achievements of students who participated in both forms of education, a conclusion can be drawn (in spite of the limitation resulting from a small number of distance learning participants) that the level of effectiveness of both modes of information transfer, stationary and via the Internet, is comparable. It is confirmed

**Table 1.** The effectiveness of distance and stationary education

Form of education in the 1st semester	Total number of participants	Number of participants who passed the test at the 1st attempt	Number of participants who defended final thesis
Distance learning	24	20	21
Effectiveness	-	~83%	~87%
Stationary course	129	108	115
Effectiveness	-	~83%	~89%

by practically equal percentage of people who passed successfully the final test after the first semester (Table 1).

One of the core responsibilities of physicians is to update constantly their knowledge and skills. Therefore, the experience gained from e-learning and postgraduate study for health care managers as well as a growing interest in this form of training prompted us to design and introduce a new educational program.

An important offer of the School of Public Health in distance education for physicians was the first in Poland introductory course in occupational medicine specialization. Training was organized in line with the recommendations concerning a specialization procedure. Accreditation of training is an essential element of establishing a modern and efficient system of education in the area of occupational medicine that satisfies the most up-to-date standards [4].

The main goal of the postgraduate training in occupational medicine is to make students who are already professionally experienced develop appropriate competences to deal with health problems existing and emerging in the area of occupational health.

## COURSE DESCRIPTION

The first course in distance specialization training of physicians was designed and introduced in the School of Public Health in 2002. The introductory course of occupational medicine carried out with use of the distance learning method was treated equally to the course employing the traditional method and comprising stationary classes run for one week. Of the 22 participants taking the course, 50% of them decided to study in the distance-learning mode.

A major problem associated with distance education was the lack of "program" focus. There were fundamental problems in transferring traditional education courses to virtual format. All didactic materials had to be constructed from the beginning by the lecturers familiar with new requirements and new technology. For the majority of academics, designing the web course greatly differs from preparing a series of lectures. Updating and revision of courses must be easy and thus advantageous to lecturers [5].

The policy of the Nofer Institute of Occupational Medicine pertaining to intellectual property allows to assign ownership of all materials to the institution responsible for their development and to use them in the future.

The process of distance teaching in the introductory course of occupational medicine is characterized by asynchronous mode of temporary information transfer. CD-ROM teaching materials have been unified with the knowledge transmitted during a stationary course, relative to the basic course that constitutes the consecutive stage of the specialization training. Experienced lecturers who are experts in their own domains ensure the proper content-related and good quality teaching.

The means of transmission is the text connected with the graphics enriched with pictures, diagrams, maps and graphs as well as with links to some external sources of information in the world wide web sites. E-mail has been chosen to be the major means of communication between lecturers and participants. It serves to send and receive textual information as well as various files directly connected to the mail (so called attachments). The participant of the course begins with the process of reviewing consecutive sites (written in HTML language). The interaction is limited to passing from site to site by means of links. The learning is enriched with hyperlinks.

The organization of the introductory course by means of distance learning has the following pattern:

- the participant is registered, the teaching materials are made available and the e-mail contact address for the participant to receive tests and other organization information is established;
- the participant studies using materials supplied in any time and at any place; the final time limit is established

(the deadline is announced at the time of registration and via e-mail);

- the participant receives tests sent by the administrator, sends back his or her answers; the results as well as comments and suggestions are sent by lecturers via e-mail;
- the Internet part is completed if all test questions are answered correctly.

In case of introductory course the interaction between learners and their teacher was limited, mostly because of the following reasons: limited financial resources, the present insufficient infrastructure of the Institute to deliver the program, and the fact that it was the first course covering a small target group of physicians specializing in occupational medicine (several people from all over Poland every year). The interaction involved the e-mail contact and the colloquy with the head of introductory course.

The following speaks in favor for training in the form of distance learning, besides face-to-face teaching: small capacity of the course, heterogeneity of problems addressed and their rather general than very specific analysis, enlargement and completion of all the problems during future deeper study.

An additional advantage of implementing distance education is that from the beginning of specializing training it was stipulated that this form of gaining knowledge in continuous education must be an integral part of continuous professional development under conditions of acquiring knowledge and professional skills.

The colloquy with the head of the introductory course in the Nofer Institute of Occupational Medicine, Łódź was held on the last day of the stationary introductory course. Of the 10 students enrolled in the distance learning course who held the colloquy at the end of the course, only one failed to pass it, however she passed a repeated oral examination.

The colloquy that verified the gained knowledge was not held in the simultaneously running face-to-face course. The majority of physicians continued their education during the basic course which started just after the end of introductory course. This course, lasting for 8 weeks, was much wider and more specific. This was ended on the ground of the test carried out for all participants and it

**Table 2.** The results of the self-assessment of the increase in professional competences

	Distance learning	Face-to-face learning
Professional competences before training	2.64	1.92
Professional competences after training	3.90	3.14
Competence increase index	1.26	1.22

would be impossible to separate the questions only for introductory part.

To ensure adequate quality of education, the effectiveness and usefulness of this form of teaching was assessed. The post-course evaluation of all trainees was undertaken. The participants expressed their opinions on various aspects of the training in a special questionnaire prepared in cooperation with the Education Quality Division. The respondents answered two questions aimed to define the difference in perceiving their professional competence before and after the course. Scores from 1 to 5 (very low to very high) were marked. The questionnaires were fully anonymous. The competence increase index (CII) was calculated. The index shows the extent to which the training program as a whole contributed to the improvement of a particular type of competence in terms of acquiring new knowledge and skills, enlarging the competences already possessed, etc. However, the CII reflects the respondents' subjective judgement. There is some correlation between the subjective and objective assessment of developed competences [6].

In the group of physicians participating in distance education, the absolute CII was 1.26, whereas in the group following the traditional face-to-face education it accounted for 1.22 (Table 2).

The effectiveness of teaching was assessed by means of stage tests and the oral examination in case of the introductory course in occupational medicine. There was no difference between two groups of trainees.

## CONCLUSIONS

The Internet has totally changed the way knowledge is stored, disseminated, obtained, and used. Information

technologies change teaching methods and the way in which education can be provided. Face-to-face teaching still predominates in medical studies.

Numerous researchers have shown that some factors such as learning and achievements in distance education groups are comparable to those observed in traditional face-to-face classes [7]. Students using technology in distance education have learning outcomes similar to those observed among students following traditional forms of education [8].

Performance and satisfaction are also nearly the same in both groups [9]. We noticed the same in all groups of participants. The students differed in terms of technical skills and that was probably the reason for choosing two different ways of knowledge delivery in the beginning of training. The level of satisfaction with the contents of the course and with the medium used were high in distance learning group.

The value of distance learning is obvious. Learners participating in this kind of courses must play an active role in the distance delivered course by taking full responsibility for their own learning. They do not attend class. This gives them ultimate flexibility in structuring their time. They do not need to leave home, and they are able to be in regular employment. Participants of a distance learning class decide themselves how to work through the course materials, what resources to draw upon and so on. They must be responsible for organizing their work and time to meet course requirements and deadlines, must be highly motivated and need good organizational and time management skills, otherwise they may face educational problems. The ability to communicate in writing, display initiative, and commit oneself to achieving high standards is a major prerequisite for participating in this form of education.

Pragmatic aspects such as flexibility in time and space for learning is especially important for adult learners.

Distance education courses have been only recently organized by the School of Public Health at the Nofer Institute of Occupational Medicine with relatively small groups of students.

These small, stratified populations typically defy relevant statistical analysis. Further studies should be conducted

to analyze plenty of issues pertaining to new methodology, and relevant teaching and learning techniques, but this should not be any obstacle in introducing successive courses.

A series of courses could be developed to address the needs of professionals who require additional training not only for meeting the requirements of successive stages of their professional career but also to work in various areas of occupational health.

The problem of great importance can be the lack of adequate financial resources for producing new high quality didactic materials. The cost of technology that enables a flexible responsive offer of education is not to be underestimated. Redefining the roles of teachers and learners, and discovering new environment that functions as a complex adaptive learning system is very important. An effective and efficient approach to the production of distance learning materials, involving collaboration between experts in this field, editors and instruction designers is essential.

The future of distance learning especially for professionals who need continuous education throughout their life to keep their knowledge and skills up-to-date seems to be bright. The formal qualifications in occupational medicine play a very important role in the future career of physicians who wish to be specialized in this discipline, therefore, they form a group of learners who are looking for not expensive and flexible possibilities of training.

Based on the experience gained to date, the following conclusions can be drawn:

1. A new form of education in occupational medicine, offered first in Poland, encouraged us to compare the results of new and traditional courses required for specialization. In the Nofer Institute of Occupational Medicine, 50% of participants enrolled in the 2002 introductory course chose the method of distance learning.
2. The quality of teaching in distance learning is comparable to that achieved with the stationary method.
3. A particular interest in distance learning among physicians specializing in occupational medicine indicates the need to consider a possibility to introduce consecutive courses.

4. A series of courses could be developed to address the needs of this group of professionals who need further training.

5. There are some limitations in implementing distance education. Among them some are of particular importance: high costs of infrastructure needed to deliver online programs, difficulties in tailoring the curriculum based on high technology, developing learners' motivation, technical skills, and learning objectives, and doubts among the teaching staff how to ensure the integration of students.

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