

# Distance learning courses in occupational medicine - Methods and good practice

## Abstract

The need for training in Occupational Medicine in India is well known. The majority of company doctors cannot leave their work and join a residence program. The question which course delivery mode - residential or blended or distance education - is appropriate to teach working company doctors is therefore an urgent one.

Adult education: Adults learners - in contrast to young students - have a lot prior experiences and knowledge which they want to use. They have tight personal schedules and are very practical and goal-oriented. They usually have a fulltime work. Adults need more guides than lecturers.

Immediate use, practice by doing and discussion groups are the most powerful tools in teaching. Lecturing seems to be the most ineffective teaching method.

Distance education is widely used already in teaching occupational health & safety and occupational medicine (OS H) in other countries. Almost 100% of all post-graduate teaching in occupational medicine is done by distance education in the UK. A "blended" course model seems appropriate for Occupational Medicine teaching. It has contact phases and self-learning phases

The Indian Association of Occupational Health could play a leading role in expending high quality teaching in Occupational Medicine. These activities would contribute to the Government's goals to strengthen Occupational Health in India.

This article discusses distance education and online-teaching as one viable way to deliver high quality training in Occupational Medicine to working company doctors in India.

**Key Words:** Occupational medicine, Adult education, Distance education, Online teaching, Company doctors, Occupational physicians, Post-graduate medical education

need for training is well known and has often been discussed in this journal.<sup>[4, 2, 3, 4].</sup>

Unfortunately the vast majority of company doctors cannot leave their work and join a residence program. The question which delivery mode is suitable to teach Occupational Medicine is therefore an urgent one. How can we reach the company doctors with our teaching?

This article discusses methods and good practices in distance education and online-teaching as one viable way to deliver high quality training in Occupational Medicine to employed company doctors in India.

## Adults as Students - a Challenge for Teachers

The difference between adult learners and young students has been described in detail in numerous, easily accessible publications.<sup>[5, 6, 7, 8, 9]</sup> In summary, we can say that research has shown the following important aspects, which have direct bearing on our teaching in occupational medicine.

Adults - in contrast to young students - have a lot prior experiences and knowledge, they have tight personal schedules and are very practical and goal-oriented. They usually have a fulltime work and often cannot take off for months.

They want and deserve out utmost respect from us teachers. After all, would we be willing to put in another five to ten hours of learning every week for one year?

Adult learners need a guiding teacher

**N. L. Wagner\*,  
P. J. Wagner,  
Jayachandran P\*.**

\* Department of  
Environmental Health  
Engineering Sri  
Ramachandra Medical  
College and Research  
Institute (Deemed  
University) Chennai,  
India

## For correspondence:

N. L. Wagner,  
Department of  
Environmental Health  
Engineering Sri  
Ramachandra Medical  
College and Research  
Institute (DU) 1,  
Ramachandra Nagar,  
Porur Chennai 600 116  
India. E-mail:  
NLWagner@web.de

## INTRODUCTION

Training in Occupational & Environmental Medicine in India Most company doctors in India have not received any specialized training. They do a good job in delivering general medicine at the workplaces. Occupational Medicine though deals primarily with prevention. Hence special training, special knowledge and workplace skills are necessary. The



more than a lecturer. They can learn and solve problems by themselves if we guide them, point out sources for solutions, show techniques to solve problems. For adult learners "learning how to do it yourself is the goal and *not* "being told old solutions" which do not apply to their new and changing challenges. Then the problem-based learning will create significant learning experiences.<sup>[10]</sup>

If the content is not connected to every day practice the chances of it being retained and remembered are very slim. To help the students learn and become better company doctors we have to measure our teaching by its value to solve the every day problems of company doctors in their companies. At the very end: we teach to improve every day practice, isn't it?

### How does "Learning" Work?

Obviously we humans need different stimuli to learn things, especially when we make the transition from "just repeating knowledge" to high level tasks like "analyzing" or "problem solving". Unfortunately these higher level skills are what is most needed for company doctors! These skills define our quality as adviser for management in questions of e.g. health problems, prevention of accidents and disease, absenteeism, choice of machinery, training program design, conflicts with workers on safety or health questions. Company doctors rarely need simple book knowledge.

To help adults learn we can look to what we know about the process of learning itself. Which teaching method helps most to remember and apply new knowledge? Research has shown that immediate use, practice by doing and discussion groups are the most powerful tools in teaching [Figure 1].<sup>[11]</sup> Lecturing seems to be the weakest and most ineffective teaching method if we look at retention of content 24 hours after "being taught".<sup>[11]</sup>

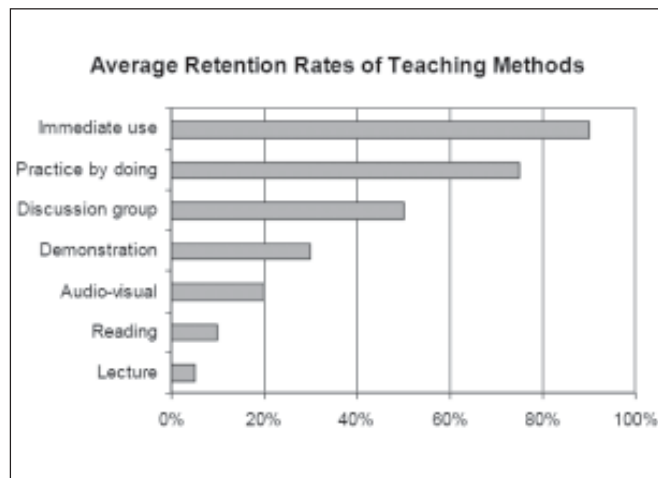


Figure 1: Average Retention Rates of Teaching Methods <sup>[11]</sup>

Problem-based learning is probably the most powerful tool in teaching Occupational Medicine that we have as teachers.<sup>[12]</sup> Active learning techniques like guided discussions, exercises, case studies, group work and presentations will use different learning capabilities of adult learners (like seeing, analyzing, discussing, doing, applying and explaining) to engrain knowledge, develop problem-solving skills and develop professional attitudes. Help for teachers is easily at hand.<sup>[13,14]</sup>

### Consequences of Teaching in Occupational Medicine

- More interaction rather than lecturing will improve the retention rate and will develop skills on top of knowledge
- Different learning styles need different teaching and assessment methods to give each learner a chance to learn and to excel
- Practical training for hands-on skills will improve retention, reveal misunderstandings and will help company doctors to run Occupational Health Centers
- Applying the learnt content in new situations by working through problems and case studies will help develop practical skills in finding solutions and sharpen the analyzing and argumentation skills
- Regular presentations by students and team work are necessary to develop professional attitudes and communication skills e.g. for management meetings and report writing
- Development of professional attitudes towards standards and codes of conduct have to be in integral part of teaching of company doctors

### Distance learning - A Practical and Effective Teaching Method

Distance education is widely used in teaching all kinds of professional courses at under-graduate, graduate and even post-graduate level in other countries. In the US and UK some universities do not have a campus anymore, they deliver their training exclusively as distance learning courses. Masters course in distance mode for occupational health & safety and occupational medicine (OSH) are available in other countries. Almost 100% of all post-graduate teaching in occupational medicine is done by distance education in the UK.<sup>[15,16]</sup> In Australia a multitude of high quality masters programs in OSH can be done in distance education mode.<sup>[17]</sup>

To balance the pro's and con's of either a purely residential or a purely distance education course a so-called blended course model seems appropriate for teaching Occupational Medicine. It has contact phases and self-learning phases. The knowledge transfer and studying can easily be done in the self-learning models at the learner's pace (e.g. in the evenings or weekends) with guided readings and assignments. The higher level skills like problem-solving, analyzing workplaces, ethical considerations, professional attitudes or team cooperation can be trained in the contact programs.<sup>[18]</sup>

Students' assessment and prevention of cheating is naturally a topic in distance education. Fortunately a lot of guidance is there from teachers' organizations and universities how to handle the problem.<sup>[19, 20, 24, 22, 23]</sup> Assessment techniques like regular and frequent assignments, personal experience assignments (e.g. case discussions), essay type questions or students' portfolios can easily be used in distance and online teaching. To that range of assessments throw in the closed-book examinations at the contact programs, the assessment of practical skills during workplace visits and practical training, the case presentations and we have a good mix of multiple assessments which are hard to cheat without getting caught!

Online teaching as a sub-specialty of distance education is professionally developed and used in high quality teaching at graduate and post-graduate level around the world. Techniques and guidance is easily available for teachers in Occupational Medicine.<sup>[24, 25]</sup>

### **Evaluation and Feedback**

Teaching and learning thrives on feedback. Every course needs critique and feedback to grow, change and improve. Regular feedback from our customers, the students, on the quality of our teaching and the quality of the lecturers should be a normal part of our courses. Evaluating the impact of the course and the progress of the students helps to develop a "learning attitude" for both, the teachers and the students. Distance Learning in India

Here in India distance education in OSH and Occupational Medicine is rarely used. Distance education in general is often perceived as being of low or no quality. Unfortunately that might be true in many cases. Some universities are trying to change that and are doing their best to introduce distance and online education seeing the enormous advantages such a course delivery mode has in a country like India.<sup>[26]</sup>

Often students and teachers are falsely convinced that distance education means automatically part-time and low-quality education. If one looks at distance learning courses in other countries it is obvious that a full-time course means actually eight hours work per day for a student. The only difference is that the physical presence on campus is not required. The time required for a course is something the teacher decides, not the method. Therefore it is a perfect fit for our customers, the factory medical officers who work in companies all over the country.

The same applies to the quality. Low quality in distance education is a result of the teacher's quality and not of the inherent problems of the teaching delivery method. A multitude of courses for faculty are available to learn good online-teaching practices.

## **CONCLUSION**

Distance learning, especially when used in blended courses, is an adequate delivery method for teaching knowledge, skills and attitude in Occupational Medicine. Here in India the need for training the huge number of doctors who already work in companies without any training is obvious. Part-time distance education coupled with contact programs for skills training and quality control can be a viable way to improve the quality of occupational health in the country. The quality of the teachers to deliver is crucial though.

The Indian Association of Occupational Health could play a leading role in expanding high quality teaching in Occupational Medicine. Important steps and analysis has already been done and published in this journal.<sup>[27, 28]</sup> We could contribute to the Government's goals to strengthen Occupational Health in India.<sup>[29]</sup>

Develop a modern curriculum, organize teachers' training, standardize the course contents and the evaluations, develop nation-wide course objectives and define the professional levels which is required in each area of practice could all be topics to be taken up in an organized way.

### **A One Year Distance Education Course in Occupational Medicine**

The "PG Certificate Course in Occupational Health" conducted in Chennai, is a one year, web-based, blended course for company doctors.

Out of 500 total course hours about 170 (34%) are actually "distance-learning" i.e. self-learning time for the students, 26 hours (5%) are workplace exercises in their companies and 224 (45%) are contact program hours. The project paper accounts for 80 hours (16%).

Every student has an experienced company doctor as tutor to support and facilitate the learning and help them through the course.

For the batch 2004-2005 four contact programs with 224 hours were conducted. They include e.g. workplace visits, patient examinations and clinical case discussions, hands-on training. The different teaching methods used in the contact programs are shown in [Table 1].

The 34 weekly distance-learning modules (six hours each) include mandatory reading and assignments. In total the students had to send back 25 mandatory assignments for grading (including nine postings on the course web site) and could also finish nine voluntary assignments.

Internal assessment and quality control was accomplished

**Table 1: Teaching Methods in Contact Programs**

Teaching Method	Hours	Percent
Lectures	61	27%
Group Exercises & Case Studies	28	13%
Colloquium & Students' Presentations	45	20%
Clinical cases & discussion	18	8%
Workplace visit & presentations	32	14%
Computer exercises	12	5%
Practical hands-on training	28	13%
Total	224	100%

with five internet-based tests, four closed-book examinations and three practical examinations (spirometry, audiometry, presentation) during the contact programs. The final examination is conducted as standard university examination. It includes two theory papers; practical and oral examination including spotters had to be passed by the students. External examiners are invited to insure quality. We had the honor to have Dr. Saiyed H. N. from National Institute of Occupational Health, Ahmedabad, and Dr. Ranga Rao from Central Labor Institute, Mumbai as examiners. During the practical training the students work usually in groups of three at audiometers, spirometers, industrial hygiene equipment (like sound level meter or pumps for dust measurement) and on computers (retrieve information from journals, databases on CD or internet). Every student alone or in small groups had to do approximately seven presentations to practice presentation and reporting skills. A project paper has to be written as a scholarly paper to be eligible for final examination.

In the middle and at the end of the year a course evaluation was requested from the students to get feedback on the course quality (content and conduct) and to measure the learning impact ("before" and "after" comparison). According to the feedback from the students this practice-oriented course had a enormous impact on their professional life and attitude.

## ACKNOWLEDGEMENT

This article has profited from the many discussions with my colleagues of the Department of Environmental Health. They helped develop the practical aspects by conducted the academic programs. I thank my colleague, Dr. Zareen, for her positive critique which helped improve the manuscript.

## REFERENCES

- Cooper J, Rajgopal T. Professional Skills Classification and Skills Levels for Occupational Health Professionals. *Indian J Occup Environ Med* 2002;6:2-4.
- Kulkarni GK. Occupational Health Service Need for Competency Development. *Indian J Occup Environ Med* 2005;9:5-6.
- Sinha YN. Challenges & Strategies of Training & Education on Occupational Health. *Indian J Occup Environ Med* 2000;4:62-3.
- Joshi TK, Smith KR. Occupational Health in India. *Occup Med* 2002;17:371-89.
- Knowles MS, Holten EF, Swanson RA. *In: Woburn MA, editor. The Adult Learner*, 5<sup>th</sup> ed. USA: Butterworth-Heinemann; 1998. p.
- Vella J. Learning to Listen - Learning to Teach - The Power of Dialogue in Educating Adults. (The Jossey-Bass Higher and Adult Education Series). Revised ed., John Wiley & Sons: San Francisco CA, USA; 2002.
- Brookfield SD. Understanding and Facilitating Adult Learning - A Comprehensive Analysis of principles and Effective Practices. (The Jossey-Bass Higher and Adult Education Series). John Wiley & Sons: San Francisco CA, USA; 1986.
- Imel S. Guidelines for Working with Adult Learners. Educational Resources Information Center - Clearinghouse on Adult Career and Vocational Education Columbus OH (ERIC Digest No. 154) accessed on 23. Jan 2005 at [http://www.ericfacility.net/databases/ERIC\\_DigestsIndexI](http://www.ericfacility.net/databases/ERIC_DigestsIndexI)
- University of Hawaii USA. Principles Of Adult Learning - "Treat Learners Like Adults. Accessed on 24. Jan 2005 at <http://www.hcc.hawaii.edu/intranet/committees/FacDevCom/-guidebk/teachtip/teachtip.htm>
- Fink LD. Creating Significant Learning Experiences - An Integrated Approach to Designing College Courses (The Jossey-Bass Higher and Adult Education Series). John Wiley & Sons: San Francisco CA, USA; 2003.
- Sousa DA. How the Brain Learns - A Classroom Teacher's Guide. 2nd ed. Thousand Oaks referring to research done by National Training Laboratories Bethel Maine. Corwin Press: CA USA; 2001. p. 95
- Peterson M. Skills to Enhance Problem-based Learning. *Med Educ Online* [serial online] 1997;2:3. Available from: URL <http://www.Med-Ed-Online>.
- McKeachie WJ. Teaching Tips. 11<sup>th</sup> edn. Houghton Mifflin Co: Boston MA USA; 2002.
- Morrison-Shetlar AI, Marwitz MR. Teaching Creatively - Ideas in Action. Outernet Publishing: Eden Prairie MN USA; 2001.
- Harrison J, Chairman of the Faculty of Occupational Medicine, Royal College of Physicians UK, personal communication, email from 11. Nov 2004 to the author.
- University of Manchester, Centre For Occupational & Environmental Health. MSc or Advanced Diploma In Occupational Medicine. Accessed on 1. Nov 2005 at <http://www.medicine.man.ac.uk/epidem/coh/homepage.html>
- Government of Australia, State of Western Australia, Department of Consumer and Employment, Safetyline Institute. Accessed on 23. Jan 2005 at <http://www.safetyline.wa.gov.au/institute>
- Poon SK, Reed S, Tang C. Problem-based Learning in Distance Education. Proceedings of the 5th International Conference on Modern Industrial Training, Jinan China. 1997. pp. 593-600. Accessed on 27. April 2005 at <http://www.ic.plyu.edu.hk/loess/paperslpbl.htm>
- Illinois Online Network. Student Assessment in Online Courses. Accessed on 23. Jan 2005 at <http://www.ion.illinois.edu/IONresources/assessment/>
- Australian Flexible Learning Framework. What have we learnt about Online Assessment. Accessed on 23. Jan 2005 at <http://flexiblelearning.net.au/>
- Anderson, J 2001, Final Report: Flexible Learning Leaders. Research investigation on Online Assessment as an Integral Part of Flexible Online Delivery. Accessed on 23. Jan 2005 at [http://flexiblelearning.net.au/leaders/past\\_fellows/2001/janice\\_anderson.htm](http://flexiblelearning.net.au/leaders/past_fellows/2001/janice_anderson.htm)
- McLoughlin C, Luca J. Quality in Online Delivery: What Does it Mean for Assessment in e-Learning Environments? In Meeting at the Crossroads proceedings of Australasian Society for Computers in Learning in Tertiary Education (AS CILITE), 9-12 December 2001., Melbourne. Accessed on 23. Jan 2005 at <http://www.ascilite.org.au/conferences/melbourne01/pdf/papers/mcloughlin2.pdf>
- Rooks VD. Prevention of cheating in distance learning. Accessed on 23. Jan 2005 at <http://leahi.kcc.hawaii.edu/org/tcon981paper/>

- rooks.html
24. Horton S. Web Teaching Guide: A Practical Approach to Creating Course Web Sites. Yale University Press; New Haven USA; 2000.
25. Hanna DE, GI owacki- Dudka M, Conceicao-Runlee S. 147 Practical Tips for Teaching Online Groups - Essentials of Web-Based Education. Atwood Publishing; Madison WI USA; 2000.
26. Dutta PK, Jena TK, Panda SK. A Plea for Health Manpower Training Through Distance Education. Med Educ Online [serial online] 1996;1:8. Accessed on 24. Jan 2005 at <http://www.Med-Ed-Online.org>.
27. Agnihotram RV. An overview of occupational health research in India. Indian J Occup Environ Med 2005;9:10-4.
28. Kulkarni GK. Presidential Address - Dr. G. K. Kulkarni - 52nd National Conference in Occupational Health at Goa 7-10. Indian J Occup Environ Med 2002;6:21-31.
29. Government of India, Planning Commission. Report Of The Working Group On Occupational Safety And Health For The Tenth Five Year Plan (2002-2007), September-2001. (TFYP Working Group Sr. No.47/2001). Delhi: Government Printing Office; 2002.