E-LEARNING IN THE FIELD OF OPHTHALMOLOGY

Slaveykov K., Trifonova K., Despotova-Toleva L., Stoyanov V., Shosheva V.

Trakia University, Stara Zagora, Bulgaria

Keywords: ophthalmology, e-learning, Internet, e-education, information technologies

Introduction: Since their creation Internet and information and communication technologies have spread world wide and have become an integral part of our everyday life. They have become part of every aspect of society from entertainment and banking to healthcare delivery and education. The usage of Internet technologies and their applications in the field of education is known as e-education. E-education includes a large variety of methods: online lectures and information, audio and video teleconferencing, interactive software, problem-based learning. The primary tools of e-education are e-mail, e-meetings, e-expeditions, and the methodologies of a pedagogy known as e-learning. E-learning is part of e-education and is characterized by the heavy reliance on the computer with the internet as the main instrument for the enhancement of individual performance, where as e-education is a multi-media event. E-learning is a fast developing new aspect of education that has centered the attention of nearly every training sector due to the many benefits it can provide for both teachers and students. [29] E-learning can be used as an addition to the traditional teaching method providing self-directed and individualized learning experience. [17] The use of computer-assisted instruction in medical education has increased steadily in the last decade with the availability of personal computers. Many computer-assisted programs can be used to train residents in the required skills for their area of expertise. Ophthalmology as a field of medicine relies heavily on images and more often than not findings and diagnosis are made based on visual information. This aspect of ophthalmology makes it a prime candidate for e-educational purposes [21].

Aims: To create a systematic review of existing literature. The main tasks are:

1. Assessment of benefits e-education gives.
2. Availability of e-education and existing barrier for its implementation
3. Future directions and development of e-education in ophthalmology.

Materials and methods: Literature review

Results: The subject of e-learning in ophthalmology is first brought up in 1975 by Cuendet JF et al. At the time the term e-learning still didn't exist and in their work they present the possibility of computer assisted learning (CAL) in ophthalmology [3]. Two years later the same team considers most technical obstacles overcome and presents solutions to the remaining ones. [4] While there are many new barrier to e-learning implementation at that point in time the existing problems appeared solvable.

Arden GB further develops the idea of computer use in ophthalmology. In his study he presents the existing to that moment technology and his vision for its future development. Arden stresses that education is one of the aspect that would benefit most for computer integration in healthcare [1].

In 1990 Giezendanner FD summirises the possible usage of existing computer technologies in the educational field. [12] With the advancement of information technology new possibilities become available for training purposes of residents and students. In the 90s most computer-assisted teaching methods focused on a single issue with comprehensive view of the subject seemingly not feasible at the moment.

Folberg et al. create a large database including high quality illustration, photographs and dynamic introduction to pathophysiology using interactive animation sequences. The team presents this as an inexpensive alternative to the existing technologies, making computer-aided education available for personal use [10].

Lonwe B and Heijl A research the use of computer-assisted instruction in emergency ophthalmological situation. They develop a system that allows inexperienced students to learn and improve skills, without jeopardizing the patient's health during training. After having used the system, the majority regarded it as a valuable or very valuable addition to traditional methods of teaching. The team concludes that the instruction system can improve the quality of ophthalmic teaching without increasing teaching staff requirements [23].

Kaufman D et al. study the impact of a multimedia computer-aided learning (CAL) program in third year ophthalmology clerkship. The research shows very good results with improved understanding in all participants. [19]

In 1995 Lee JM et al develop a similar program "The educational program on ophthalmology" that offers interactive and self-controlled ways of learning through multimedia and hypertext [24].

Limited number of patients and time is a major problem in ophthalmology training. To overcome those difficulties and reduce risk for clinic patients Dick GB et al implement a computer-assisted teaching program focused on primary open-angle glaucoma. The program includes anatomy, pathology, clinical symptoms and finding raising the quality of the educational process [8].

Surgical skills are another aspect of ophthalmology which presents a problem for trainees. In order to improve existing skills and induce the creation of new ones in 2000 Mehrabi et al research the possibility of teaching surgical skills via computer-aided learning program. The test results show that when used in conjunction with standard teaching methods improve student result 15-20% [25].

Hamam researches the application of e-learning in teaching laser surgery, showing promising results and improved skills in participants [15].

In 2001 Devitt P et al create a computer program with a problem solving format that includes the most common ophthalmic conditions. After implementing the program in student education test results were compared between groups who participated in the program and those who did not. Results show that a suitably constructed material on the computer is a useful aid in teaching ophthalmology to medical undergraduates and the material and the medium also act as a stimulus for further learning [5].

Kong J et al further explore the benefits from problem based learning (PBL) in their 2009 study. Dividing a 30 person class in three groups taught by different methods they found that PBL improves the quality and effectiveness of the educational process, while digital PBL also motivates students to further improve diagnostic and problem-handling skills [18].

Kuchenbecker J. and Demeler U. also research the educational aspect of computer implementation in ophthalmology [20].

With the creation and wide spread of Internet it also becomes a part ofthe e-education process. Dick B and Pfleiffer N. create a comprehensive analysis of existing ophthalmologic services on the internet. [7] The team also analyzes the subject of internet use for ophthalmological teaching further by discussing most common encountered problem, technical and legal issues [6].

While the Internet holds promise for many benefits it also presents new barriers and obstacles for their implementation. Dietel M creates a comprehensive analysis of the possibilities and limitation of tele-education in his study from 2001. [9] Lack of quality, communication and integration into the existing structures are cited as most common barriers. Friedman RB further expands on the subject of expected problems, describing the ten most obvious reasons, that if not overcome would cause e-education could fail [11].

Another problem that stops the implementation is the readiness of physicians for web-based learning environment. Stokes CW et al research the problem further, finding that 66% of the participants use computer aided learning packages, but nearly all of them don't plat to continue using them or plan the severely limit their use [32]

Michelson et al study a more limited use of e-education with live broadcasting. [26] Later they expand on the system including live transfers and on demand lectures, showing us that such a system can be created with little to no prob¬ lems [27].

In 2002 in Tuebingen the first interactive case demonstration software (TES) for Germany was created. TES was found to be an easy to use tool suitable for lecturers and students and was one of the first major steps towards realistic, practice-oriented and interactive education. [30]

Glittenberg and Binder study the usage of 3D design software for teaching purposes in neuro-ophthalmology and surgery. The study has overwhelmingly positive feedback and the teaching method is rated as superior the classic methods by all participants [13].

Prinz A et al continue to research the advantages of 3D animated teaching for ophthalmic surgery and compare it to traditional videos. The results show better spatial and theoretical understanding of difficult topic in ophthalmic surgery compared to the control group [28].

In 2006 Glittenberg and Binder further explore the possibilities of 3D teaching and develop an effective method for teaching complex topics in ophthalmology via 3D animation and interactive technologies. The test result show that three-dimensional computer animation technology can significantly increase the quality and efficiency of the education and demonstration of complex topics in ophthalmology [14].

In their 2011 study Handzel DM and Hesse L analyze the existing web-based learning application that German University Hospitals provide to visitor, students and doctors. The applications are evaluated in terms of quality and quantity. The authors note excellent availability, with all 36 web sites accessible by everyone, but while most provide information for both students and doctor (28) there is a great variation in both its quantity and quality. Only 9 of the sites have e-learning platforms on them and no website makes use of crediting successful studying. One of the major problems for most of the web sites is the inability to check if the information is up-to-date. [16]

In 2006 the University Eye Hospital Freiburg (Germany) introduces an Internet-based e-learning module as part of the ophthalmology training for medical students. [2] Results from the follow up tests show that e-learning is a sensible addition to the established ophthalmology training for medical students. It is comparably easy to integrate into the curriculum and is well accepted by medical students [31].

In 2009 the e-learning consortium of Korea publishes the results from e-learning implementation. The results show that e-learning increases efficiency and effectiveness of the teaching process when used with standard teaching methods with a large field for further improvement [22].

Conclusion: E-learning and e-education in a boarder view offer many benefits for both teachers and students and while there are barrier to their implementation most can be overcome. Despite those benefits e-education cannot replace the existing methods of education and its main role should stay supplementary to traditional lectures and teaching methods in the field of ophthalmology [33].

Summary: E-learning is a promising new aspect of teaching that allows students to improve their skills and acquire new ones without additional risk for the patients' health. E-learning is inefficient on its own, but when used to supplement standard teaching methods it improves the efficiency and efficacy of the teaching process without increasing the requirement for the teaching staff. At the same time lack of readiness of the physicians to participate in a web-based learning environment, lack of interoperability, a large variety in quality and quantity of existing software present a barrier that prevents implementation.

REFERENCES:

1. (Arden GB. The use of computers in ophthalmology: an exercise in futurology. Trans Ophthalmol Soc U K.1985;104(Pt 1):88-99.)

2. (Boeker, Martin; Biller, Silke; Agostini, Hansjurgen; Klar, Rudiger; Reinhard, Thomas and Stahl, Andreas. e-

Learning in Ophthalmology: An Approach with High Learner Acceptance [online]. In: Kuhn, Klaus A (Editor); Warren, James R (Editor); Leong, Tze-Yun (Editor). Medinfo 2007)

3. (Cuendet JF, Gygax PH, Vergriete JC. Computer assisted teaching in ophthalmology Bull Soc Ophtalmol Fr. 1975 Dec;75(12):1123-5.)

4. (Cuendet JF, Gygax PH, Vergriete JC. Computer-aided teaching in ophthalmology. Doc Ophthalmol. 1977 Apr 29;43(1):11-5.)

5. (Devitt P, Smith JR, Palmer E. Improved student learning in ophthalmology with computer-aided instruction. Eye (Lond) 2001;15(Pt 5):635-639. doi: 10.1038/eye.2001.199.)

6. (Dick HB, Haberern G, Kuchenbecker J, Augustin AJ. Internetprasenz und Homepagedesign fur Augenarzte. Ophthalmologe. 2000;97(7):503-510. doi: 10.1007/s003470070083.)

7. Dick HB, Pfeiffer N. Ophthalmological information services on the internet—an analysis of user hit. Klin Monbl Augenheilkd. 1997;211(5):aA14-aA16.

8. (Dick HB, Zenz H, Eisenmann D, Tekaat CJ, Wagner R, Jacobi KW. Computer-assisted multimedia interactive learning program "Primary Open-Angle Glaucoma". Klin Monbl Augenheilkd. 1996;208(5):A10-A14.)

9. (Dietel M. Moglichkeiten und Grenzen der Telemedizin. Forsch Lehre. 2001;4)

10. (Folberg R, Dickinson LK, Christiansen RA, Huntley JS, Lind DG. Interactive videodisc and compact disc-interactive for ophthalmic basic science and continuing medical education. Ophthalmology.1993;100(6):842-850.)

11. (Friedman RB. Top ten reasons the World Wide Web may fail to change medical education. AcadMed.1996; 71(9): 979-981. doi: 10.1097/00001888-199609000-00013.)

12. (Giezendanner FD. Nouvelles technologies E'ducatives multimedia au service de nouvelles strategies pedagogiques. Schweizerische medizinische Wochenschrift 1990;120:1843-57.)

13. (Glittenberg CG, Binder S. Computer-assisted 3D design software for teaching neuro-ophthalmology of the oculomotor system and training new retinal surgery techniques. Proc SPIE 2004;5314:275-85.)

14.(Glittenberg C, Binder S. Using 3D computer simulations to enhance ophthalmic training. Ophthalmic Physiol Opt. 2006 Jan;26(1):40-9.)

15. (Habib Hamam Dynamic interactive e-learning application to optics and laser surgery) Proc. SPIE 5578, Photonics North 2004: Photonic Applications in Astronomy, Biomedicine, Imaging, Materials Processing, and Education, 780 (December 9, 2004); doi:10.1117/12.567454)

16. (Handzel DM, Hesse L. Web-based training in German university eye hospitals - Education 2.0? GMS Z Med Ausbild. 2011;28(3):Doc43. doi: 10.3205/zma000755. Epub 2011 Aug 8.)

17. (Harden RM, Hart IR. 2002. An international virtual medical school (IVIMEDS): The future for medical education? Med Teach 24:261-267.).

18. (Kong J, Li X, Wang Y, Sun W, Zhang J. Effect of digital problem-based learning cases on student learning outcomes in ophthalmology courses. Arch Ophthalmol. 2009; 127(9):1211-1214. doi: 10.1001/archophthalmol. 2009.110.)

19. (Kaufman D, Lee S. Formative evaluation of a multimedia CAL program in an ophthalmology clerkship.Med Teach. 1993;15(4):327-340. doi: 10.3109/01421599309006655.)

20. (Kuchenbecker J, Demeler U. Computeranwendungen in der Augenheilkunde. Ophthalmologe.1997;94(3):248-260.) (Kuchenbecker J. Multimedia-Anwendungen fur Augenarzte auf CD-ROM. Augenspiegel. 1999;45(7-8):56-60.)

21. (Kuchenbecker J, Parasta AM, Dick HB. Internet¬basierte Lehre, Aus- und Weiterbildung in der Augenheilkunde. Ophthalmologe. 2001;98(10):980-984. doi: 10.1007/s003470170049.)

22. (KYONG-JEE KIM, JOUNGHO HAN, IE BYUNG PARK, CHANGWONKEE Medical education in Korea: The e-learning consortium Medical teacher 2009; 31: e397-e401)

23. (Lonwe B, Heijl A. Computer-assisted instruction in emergency ophthalmological care. Acta Ophthalmol (Copenh). 1993 Jun;71(3):289-95.)

24. (Lee JM, Koide MM, Salvador EM, Moura J, Ramos MP, Uras R, Matos RB, Jr, Ancao MS, Sigulem D. Educational program on ophthalmology. Medinfo. 1995;8(Pt 2):1241-1242.)

25. (Mehrabi A, Gluckstein C, Benner A, Hashemi B, Herfarth C, Kallinowski F. A new way for surgical education—development and evaluation of a computer-based training module. Comput Biol Med. 2000 Mar;30(2):97-109.)

26. (Michelson G, Scibor M. Neue Kommunikationswege in der arztlichen Fortbildung - Erste Erfahrungen von Live-Ubertragungen augenarztlicher Kongresse im Internet. Klin Monbl Augenheilkd.1999;215(5):aA6-aA12.)

27. (Michelson G., Scibor M., Keppler K., Dick B., Kuchenbecker J. Augenarztliche Online-Fortbildung durch Live-Ubertragungen und on-demand Vortragen via Internet. Ophthalmologe. 2000;97(4):290-294. doi: 10.1007/s003470050530.)

28. (Prinz A., Bolz M., Findl O. Advantage of three dimensional animated teaching over traditional surgical videos for teaching ophthalmic surgery: a randomised study. Br J Ophthalmol. 2005 Nov;89(11):1495-9.)

29. (Ruiz JG., Mintzer MJ., LeipzigRM. 2006b. The impact of e-learning in medical education. Acad Med 81:207-212).

30. (Schiefer U, Schiller J, Burth R, Schnerring W. Tuebingen Education System (TES): eine interaktive Falldemonstrationssoftware. Klin Monbl Augenheilkd. 2002;219(8):597-601. doi: 10.1055/s-2002-34422.)

31. (Stahl A, Boeker M, Ehlken C, Agostini H, Reinhard T. Evaluation of an internet-based e-learning ophthalmology module for medical students Ophthalmologe. 2009 Nov;106(11):999-1005. doi: 10.1007/s00347-009-1916-2.)

32. (Stokes CW, Cannavina C, Cannavina G The state of readiness of student health professionals for web-based learning environments Health Informatics Journal September 1, 2011 17: 191-208)

33. (Szulewski A, Davidson LK. Enriching the clerkship curriculum with blended e-learning. Med Educ.2008; 42(11):1114. doi: 10.1111/j.1365-2923.2008.03184.x.)

ЭЛЕКТРОННОЕ ОБУЧЕНИЕ В ОБЛАСТИ ОФТАЛЬМОЛОГИИ

Славейков К., К. Трифонова, Despotova-Toleva \, В. Стоянов, В. Shosheva

Тракайский университет, Стара Загора, Болгария, кафедра офтальмологии и общей практики

Резюме: Электронное обучение является перспективным новым направлением обучения, что позволяет студентам совершенствовать свои навыки без дополнительного риска для здоровья пациента. Электронное обучение является неэффективным по себе, но при использовании в дополнение к стандартным методам обучения оно повышает эффективность учебного процесса без увеличения потребности в обучении персонала. В то же время отсутствие готовности врачей к участию в веб-среде обучения, отсутствие взаимодействия, большое разнообразие по качеству и количеству существующего программного обеспечения представляет трудности.

Ключевые слова: офтальмология, электронное обучение.

ЕЛЕКТРОННЕ НАВЧАННЯ В ОБЛАСТІ ОФТАЛЬМОЛОГІЇ

Славейков К., К. Трифонова, йеэро^а-То^а \, В. Стоянов, В. Зповпеча

Тракайський університет, Стара Загора, Болгарія, кафедра офтальмології та загальної практики

Резюме: Електронне навчання є перспективним новим напрямом навчання, що дозволяє студентам удосконалювати свої навички без додаткового ризику для здоров'я пацієнта. Електронне навчання є неефективним по собі, але при використанні як додаток до стандартних методів воно підвищує ефективність навчального процесу без збільшення потреби в навчанні персоналу. У той же час відсутність готовності лікарів до участі у веб-середовищі навчання, відсутність взаємодії, велика різноманітність за якістю та кількістю існуючого програмного забезпечення представляє труднощі.

Ключові слова: офтальмологія, електронне навчання.