

CURRENT STATE OF KNOWLEDGE ON THE VALUE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH EDUCATION

REVIEW

Ioannis Delimaris

<https://orcid.org/0000-0002-0880-0905>

Abstract

Information and Communication Technology (IT&C) is the use of informatics software in the teaching and learning. Health education is the interdisciplinary branch of pedagogy, medico-biological sciences and health sciences, which addresses issues of prevention and the adoption of practices and strategies to reduce morbidity and mortality in the general population. Positive aspects of IT&C in health education are: a) IT&C allows the health educator to present content that it would not otherwise be available in a traditional classroom b) the health educator via IT&C can make the lesson exciting by invoking the creativity of his/her students c) IT&C in health education creates the right conditions for cooperation, communication, feedback, knowledge dissemination, and exchange of experiences. Negative aspects of IT&C in health education are: a) many sources of information can be incomplete, unreliable, and misleading b) the dependence on computers can reduce the self confidence and social capability of the students. In this paper we attempt to summarize all the available-to-date information on these issues.

Introduction

The proper use of **Information and Communication Technology** (IT&C : the use of informatics software in the teaching and learning) in health education (id est the interdisciplinary branch of pedagogy,

medico-biological sciences and health sciences, which addresses issues of prevention and the adoption of practices and strategies to reduce morbidity and mortality in the general population) is in the spotlight of all stakeholders in recent years, as it is understood by everyone that informatics can be applied in a way that is beneficial to the educational process. These mediation facilities of the new technological tools provide promising prospects for health education policy. Health education itself, as a social component, must monitor developments and utilize the services offered by technology, in order to improve the learning outcomes and upgrade the quality of the teaching practice [1-5].

However, health education is a topic that generates many difficulties, as it has been stated by a large number of students. The learners are often confronted with a large volume of educational material, they do accumulate information and memorize knowledge, but without seeking a part of the educational material themselves, to analyze it or to connect it, in order to form a satisfactory understanding of the subject. In this paper we aim to sum up all the accessible current data regarding these issues [6-9].

Description of the state of knowledge

The introduction and utilization of IT&C in the teaching of health education should attract the interest of specialists and must be developed at the same time with research studies.

* **Corresponding Author:** Dr. Ioannis A. Delimaris, FRSPH, *Dr.Med.Sc (ClinBiochem), MSc (ClinChem), BSc (BiolSc), PGCE, QTS, Post-Doc (Nutr).*, Director Clinical Biochemist-Διευθυντής Κλινικός Βιοχημικός (Association of Clinical Laboratory Directors of Cyprus), Private Clinical Biochemist's Office, **Kremou 65, Kallithea, Athens, GR, 176 76**, dr.i.delimaris@gmail.com

Article received: 16.04.2021, **accepted:** 12.05.2021, **published:** 12.07.2021

Cite: Delimaris I. Current state of knowledge on the value of Information and Communication Technology in health education. The Journal of School and University Medicine. 2021;VIII(2):14-18

After all, informatics itself is a science but also a school subject based on information. In particular, the integration of informatics in the teaching and learning of health education (either as a channel of communication with health education knowledge, as an enhancement of active learning, or as a contribution to the development of health educational skills) is one of the thematic areas of modern teaching [10-13].

Polyphony is the part of speech where, in addition to the voice of the speaker or the writer, other voices are "heard" at the same time (which the speaker or the writer has chosen to use for various reasons). Multimodal is the text that uses a combination of semiotic modes to convey messages. For example, most texts in textbooks, newspapers, or television are multimodal, as they often combine language and image, or (in the case of television) and music. IT&C in relation to the teaching of health education offers significant assistance in many areas: for example, it can provide access to polyphonic and multimodal sources, enabling a multifaceted approach to health issues, which contributes to the promotion of research skills and critical thinking; it can also provide the possibility of teaching health education topics by teleconference, communication between students from remote schools or different countries, a fact that contributes to the promotion of collaborative learning, and the removal of stereotypes and prejudices; it can also facilitate the access to high quality visual materials and make the lesson more attractive, thus stimulating the interest of the health education students [14-16].

IT&C allows and encourages the elaboration of multidimensional synthetic works with a combination of text, image, table, graph, sound, etc. as well as publishing them on the internet. It contributes to the transition from traditional to student-centered teaching, as health education students are asked to identify and select the sources themselves; it promotes an interdisciplinary approach as it utilizes students' knowledge and skills from various disciplines; also, it promotes active learning, the formulation of questions and assumptions by students, and the ability to devise health education plans for finding the right answers to questions [17-21].

For the teaching of health education all these possibilities represent a great challenge, as health education teachers and students are forced to think in

a new way around the conditions they applied until now. In any case, a new kind of historical consciousness is being formed from the total transformation of the analog world into digital, a term that defines a complex set of growing phenomena (e.g., the annihilation of physical distance via the internet or the dissolution of material reality from virtual representations). So it is easy to conclude that, if historians in the future want to tell the past in a way that will interest others, the epistemology of health education must be renewed.

Many views have been expressed about the crucial role that IT&C plays in transforming both the form and content of the science of health education. It is believed that no other technological innovation except printing has broadened the horizons of health education as much as the internet did, as its characteristics of use affect the image we form about the world and human activity. Indeed, the internet is not just a new means of representing the past, but it is also the means by which health education is experienced in the present for students of any school cycle [22-26].

Another element of facilitation is that the internet is an innovative place for the publication of works on health education, open to all, without the restriction of editorial boards or other forms of control. It is perhaps the only space where no form of censorship is exercised, on the contrary, every written work is freed from any form of control, thus losing its unchanging element. Finally, contact lists, e-mail and websites for teaching topics such as anatomy through IT&C remove the physical constraints of space and enhance the model of face-to-face teaching, so that we can talk that health education itself happens on the internet [27-30].

Of course, all this storm of IT&C and images raises the problem of the development of defense mechanisms and how to manage the offered material. The main goal is to develop those skills that will serve health education students in the future management of everyday problems. Health education students must therefore understand that IT&C is not an end itself but a tool, and that many sources of information are incomplete, unreliable, and they are very often misleading. Also, in what regards referrals for the websites, there are specific rules and criteria that mainly concern the originality, accuracy, timeliness,

objectivity and reliability of the information on that specific health education websites [31-32].

Health Education reinforces research and exploratory learning, helping to acquire personal meaning in the construction of knowledge. It also contributes to the development of collaborative and communication skills, eliminating the natural levels of space and time. It creates an appropriate learning environment to enhance teaching with authentic health educational experiences and also enables the student to develop skills of understanding and distinguishing the validity and reliability of health educational information [33-34].

We believe in and support the use of IT&C in the teaching of health education as a means of acquiring health information, not only in the form of "text-image", as it was the case with the conventional books, but as a structured system of multiple forms of representation of health information. In IT&C health education the student can experiment and form his/her own way of thinking. Every computer tool, no matter how simple, such as a word processor, presentation tool or concept mapping software, is part of this research-educational tradition that considers computers in health education as "mental tools", i.e. tools that contribute to development. Complex reasoning, which can be the subject of discussion in the classroom, radically changes the classroom into a space for confrontation of ideas but also for a fruitful and constructive dialogue for health education issues [35-37].

If the introduction of informatics into the teaching of health education came as one of the results of the general questioning for the authority of the teacher, let it not be moved to a new authority, that of the computer. It is, perhaps, generally accepted the view that no educational or didactic innovation can be possible without the response of the manager of innovation, namely the teacher himself/herself. In order to implement and succeed in the integration of the new technology in health education, which involves the acceptance of a range of innovations, the teacher must have the necessary enthusiasm and optimism, and the will to implement it, but also the necessary didactic know-how and pedagogy training. In addition to the philosophy of knowledge, purpose and methodology, the educator who teaches health education in the classroom, must realize the need to change his/

her role and has to adopt collaborative attitudes at school. This necessity adopts a constructive approach that goes beyond the standard level of a presentation [38-39].

In a modern school, the health educator must teach health education with the aid of informatics as a lesson with critical awareness, creative thinking and the search for truth. The combination of health issues learning with informatics can ensure the ability of students to actively search and turn the cognitive process into a field of research with scientifically valid interpretation. This connection of health education with informatics leads to a new type of learning environment, which emerges as a primary necessity for modern societies. Naturally, the above does not describe a teacher who is simply informed but a teacher who is properly trained in health education developments, and translates these developments into daily work practice. In other words, his/her education must aim at acquiring technological, pedagogical and communication skills [40-41].

Conclusions

It is certain that in order to transform the teaching of health education and to realize the ideological background of the course (which will lead to the cultivation of critical health educational thought and the perception, classification and processing of health information), many efforts have to be made. These include the introduction of informatics, not as a supporter of traditional forms of teaching and behavioral learning tactics, but as a vehicle for procedural knowledge and creative thinking, through the multimodal presentation, processing of health information and the strengthening of spatio-temporal orientation.

References

1. Crompton H, Bernacki M, & Greene JA. Psychological foundations of emerging technologies for teaching and learning in higher education. *Current Opinion in Psychology*. 2020.
2. Voronenko YV, Koshova SP, Tolstanov AK. Informational and psychological technologies development of educational competencies in medical e-education. *Wiadomosci Lekarskie (Warsaw, Poland: 1960)*.2019; 72(11 cz 1):2167-2171.
3. Delimaris I, Delimaris K. Development of an educational research software with advisory role in the clinicobiochemical evaluation of amenorrhea. *Progress in Health Sciences*. 2014;4(1):83-87

4. Delimaris I, Delimaris K. Development of an educational research software with advisory role in the interpretation of calcium and phosphorus laboratory tests in human serum and/or urine. *e-Journal of Science & Technology*. 2014;9(5):161-165.
5. Delimaris K, Delimaris I. Development of an educational research software for detection of clinically important drug-drug interactions. *e-Journal of Science & Technology*, 9(1), 1-5.
6. Lukin K. Exciting middle and high school students about immunology: an easy, inquiry-based lesson. *Immunologic research*. 2014;55(1-3):201-209.
7. Fisher CM, Price JH, Telljohann SK, Dake JA. A national assessment of colleges and university school health education methods courses. *Journal of School Health*. 2015;85(4):223-230.
8. Merkel S, ASM Task Force on Curriculum Guidelines for Undergraduate Microbiology. The development of curricular guidelines for introductory microbiology that focus on understanding. *Journal of Microbiology & Biology Education: JMBE*. 2012;13(1):32.
9. Drace K. Gamification of the laboratory experience to encourage student engagement. *Journal of Microbiology & Biology Education: JMBE*. 2013;14(2):273.
10. Milic NM, Ilic N, Stanisavljevic DM, Cirkovic AM, Milin JS, Bukumiric ZM, et al. Bridging the gap between informatics and medicine upon medical school entry: Implementing a course on the Applicative Use of ICT. *PloS one*. 2018;13(4). e0194194.
11. Lufler RS, Lazarus MD, Stefanik JJ. The Spectrum of Learning and Teaching: The Impact of a Fourth-Year Anatomy Course on Medical Student Knowledge and Confidence. *Anatomical sciences education*. 2020;13(1):19-29.
12. Kuhn S, Jungmann F. Medicine in the digital age: Telemedicine in medical school education. *Der Radiologe*. 2018 ;58(3) :236-240.
13. Baloyannis SJ (1993). Psychology. Pournaras publications.
14. Clark K, Hoffman A. Educating healthcare students: Strategies to teach systems thinking to prepare new healthcare graduates. *Journal of Professional Nursing*. 2019;35(3):195-200.
15. McClelland M, Kleinke D. Improving lives using multidisciplinary education: Partnering to benefit community, innovation, health, and technology. *Journal of Nursing Education*. 2013;52(7):406-409.
16. Rienits H, Teuss G, Bonney A. Teaching telehealth consultation skills. *The clinical teacher*. 2016;13(2):119-123.
17. Gerhardus A, Schilling I, Voss M. Public Health as an Applied, Multidisciplinary Subject: Is Research-Based Learning the Answer to Challenges in Learning and Teaching?. *Gesundheitswesen (Bundesverband Der Arzte Des Offentlichen Gesundheitsdienstes (Germany))*. 2016;79(3):141-143.
18. Albert M, Friesen F, Rowland P, Laberge S. Problematising assumptions about interdisciplinary research: Implications for health professions education research. *Advances in Health Sciences Education*. 2020;25(3):755-767.
19. Thorell M, Fridorff-Jens PK, Lassen P, Lange T, Kayser L. Transforming students into digital academics: a challenge at both the individual and the institutional level. *BMC medical education*. 2015;15(1):1-10.
20. Eiland LS, Todd TJ. Considerations When Incorporating Technology Into Classroom and Experiential Teaching. *The Journal of Pediatric Pharmacology and Therapeutics*. 2019;24(4):270-275.
21. Bizopoulou A, Mangita A, Chardalias C, Coutonias P, Diomidous M. Health Professionals Information for Diagnostics Related Groups (DRGs) with the Use of a Website. *Acta Informatica Medica*. 2017;25(3):195.
22. Wysocki R, Maughan ED. Using data to tell your school health story. *NASN School Nurse*. 2019;34(5):274-277.
23. Harper E. Can big data transform electronic health records into learning health systems?. *Studies in Health Technology and Informatics*. 2014;201:470-475.
24. Guarner J, Niño SM. Microbiology learning and education online. *Journal of clinical microbiology*. 2016;54(5):1203-1208.
25. Kostenius C, Hertting K. Health promoting interactive technology: Finnish, Norwegian, Russian and Swedish students' reflections. *Health Promotion International*. 2015;31(3):505-514.
26. Delimaris I. Issues of Health Education and Human Biology for the University. Open Book Edition. 2021.
27. Kresovich A, Noar SM, Gvino E, Prentice-Dunn H, Ribisl KM. A Review of Web-Based Tobacco Control Media Archives for Researchers and Practitioners. *Journal of Cancer Education*. 2021:1-6.
28. Evans SM, Ward C, Reeves S. An exploration of teaching presence in online interprofessional education facilitation. *Medical teacher*. 2017;39(7):773-779.
29. Evans S, Knight T, Walker A, Sutherland-Smith W. Facilitators' teaching and social presence in online asynchronous interprofessional education discussion. *Journal of interprofessional care*. 2020;34(4):435-443.
30. Van Deursen AJ. Internet skill-related problems in accessing online health information. *International journal of medical informatics*. 2012; 81(1):61-72.
31. O'Mathúna DP. How should clinicians engage with online health information?. *AMA journal of ethics*. 2018;20(11):1059-1066.
32. Aslani A, Pournik O, Abu-Hanna A, Eslami S. Website evaluation tools: a case study in reproductive health information. *e-Health-For Continuity of Care*. 2014:895-899.
33. Dias da Silva MA, Pereira AC, Walmsley AD. The availability of open-access videos offered by dental schools. *European Journal of Dental Education*. 2019;23(4):522-526.
34. Van Deursen AJ. Internet skill-related problems in accessing online health information. *International journal of medical informatics*. 2012;81(1):61-72.
35. Eiland LS, Todd TJ. Considerations When Incorporating Technology Into Classroom and Experiential Teaching. *The Journal of Pediatric Pharmacology and Therapeutics*. 2019;24(4):270-275.
36. Swift A, Efstathiou N, Lameu P. Is LabTutor a helpful component of the blended learning approach to biosciences?. *Journal of clinical nursing*. 2016;25(17-18):2683-2693.
37. Douglas T. Passive to Active Learning: Engaging Students with a Technology-Based Learning System in Physiology. *The Journal for Research and Practice in College Teaching*. 2018;3(2):74-78.

38. Andrews TC, Auerbach AJJ, Grant EF. Exploring the relationship between teacher knowledge and active-learning implementation in large college biology courses. *CBE—Life Sciences Education*. 2019;18(4):48.

39. Richardson ML, Shaffer K, Amini B, Spittler NL. Advanced, interactive, image-based education: technology and pedagogy. *Current problems in diagnostic radiology*. 2020;49(2):74-81.

40. Faggioni T, da Silva Ferreira NC, Lopes RM, Fidalgo-Neto AA, Cotta-de-Almeida V, Alves LA. Open educational resources in immunology education. *Advances in physiology education*. 2019; 43(2):103-109.

41. Haidaris CG, Frelinger JG. Inoculating a new generation: immunology in medical education. *Frontiers in immunology*. 2019;10:2548.

Conflicts of Interest

The author declares that there is no conflicts of interest regarding the publication of this paper.

Funding statement

This study received no grant from any funding agency in the public, commercial or not for-profit sectors.