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ICT-enabled Teaching: the e-Bug project

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Abstract.

The main objective of the e-Bug project, launched in September 2009 in Europe, was to provide, across Europe, a new hygiene teaching resource for schools. The student website of the e-Bug project, hosting teacher resources and student activities, was launched in 2011 and was developed following successful school evaluation of the initial resource, providing interaction of the young people in Europe with high-priority public health issues (essential hygiene, prevention of infections and prudent use of antimicrobials), in a joyful and pleasant manner that increased microbiology literacy in the society. In order to achieve its aim, the eBug website (www.e-bug.eu) is continuously enriched, by the cooperation of health and education professionals, to include disease fact sheets, more interactive games, quizzes, home experiments and downloadable resources, hence supporting the learning objectives, for both junior as well as senior school students. The student website is translated to all European languages, updated regularly and often visited by children and teenagers, as a resource for school projects and amusement activities. Furthermore, e-Bug is hosted as a link in webpages by various relevant public and private organizations and has been a reference for institutions, societies and health promotion campaigns initiatives. All the above offer a complete approach through the transformation of information to knowledge and the evolution of this knowledge to skills and behavioral trends, so that the harmful belief and practice of microbiophobia is dispelled and prevention of infections is achieved, in the future generations of planet Earth.

Keywords: ICT, education, prevention, teaching, e-Bug word



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1. Introduction

The e-Bug student website offers a unique opportunity for children and adolescents in Europe to access valid and reliable information on essential hygiene measures and related diseases and treatment. Furthermore, young people interactively learn and understand why application of such measures is crucial, not only in the maintenance, but also in the improvement of their health. Moreover, they finally perceive the importance of the rational use of antibiotics and medicines in general, in the treatment of diseases that are caused by certain microorganisms. The e-Bug student website supports and enhances acceptance and adoption of beneficial health behavioral trends, through interactive, innovative and up-to date means and would, effectively, compliment national antibiotic and hygiene educational campaigns, reducing morbidity and antibiotic resistance rates as a final goal.

Since 2010, focus groups with junior and senior students as well as implementation all over Europe indicated how the website should look and be updated and upgraded. The colourful and fun website splash and landing page encourage children of all age ages (and adults) to venture further into the children's website to play the interactive games and access further materials. It contains several fun features which enable teachers to include this website in their lessons plans. These features are:

Microbe of the week:

Facts on and a picture of a new microbe every week, some useful, some harmful, but all interesting.

Fact of the week:

Some quirky, some fun, some disgusting and outright weird but all true microbe facts. *Did you know that we produce around 2 pints of snot a day, most of which we swallow!*

Revision Guides:

For students who want to learn a little bit more, or to be used in the classroom.

Disease fact files:

Fact files on important infectious diseases both new and old relative to children and young people, such as measles, influenza, holiday infections, and much more.

Quizzes:

Students can test themselves with fun quizzes, a true and false quiz for juniors and a multiple choice quiz for seniors.

Hall of Fame:

Here students can visit a lab or hand out in an art gallery hall of fame to learn about those 'boring old' scientists who have made important contributions to microbiology and medicine.

Home science:



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A series of experiments to do in the home.

Interactive games:

Fun games designed to highlight key learning points in the pack. How long can you survive the sneeze? Will you get your vaccine before the holiday bugs get you! Can you beat the computer with your microbe knowledge in our fun card game?

Downloads:

Photos of microbes, pack animated characters and backgrounds are all available here to download and to use in any school projects or just for fun.

Figure 1: The e-Bug website (www.e-bug.eu)



Although the consortium developing the e-Bug Pack and website consisted of ten (10) associated countries: France, Great Britain, Belgium, Spain, Poland, Czech Republic, Italy, Denmark, Portugal and Greece and eight (8) collaborating countries: Croatia, Finland, Hungary, Ireland, Latvia, Lithuania, Slovakia, Slovenia,, supported by EU DG SANCO grant (Lecky et al, 2011), due to the success of the e-Bug evaluation, the European Centre for Disease Prevention and Control (ECDC) had all of the e-Bug (pack and websites) resources translated into all remaining EU languages, available online from September 2011 (Lecky, 2011).

The e-Bug student website (www.e-bug.eu), has become an essential component of an educational resource that supports and enhances acceptance and adoption of beneficial health behavioral trends through interactive, innovative and up-to date means. After all, children and adolescents have always been the hope of a better future for humanity (WHO, 2000, Timmis et al., 2019).



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2. E-Bug in Greece: a few words on how we have implemented e-Bug of paper

The National School of Public Health (NSPH) had been the original partner 2006-2013 in the e-Bug project and still supports dissemination of the resource, as Department of Public Health Policies (DPHP) in the University of West Attica (since May 2019). Endorsements from Ministry of Education (MoE) & Ministry of Health (MoH) have been acquired since 2009. Both packs (2100 copies of each pack) have been distributed to all regions of the country, since 2009, through Health Education Departments in Regional Offices of the Ministry of Education. School year starts in middle September each year, in Greece. In the beginning of every school year, Regional Offices of Health Education “are reminded” of the e-Bug resource, by the Ministry of Education (MoE), through a formal letter, so that this educational resource is incorporated in their lists of available resources for Elementary and Junior High Schools. In Sept 2014, the MoE initiated the “Social School” activity. It lasted one year. The NSPH participated in this activity, through training and certifying Health Professionals (HP) and members of Parents and Teachers Associations (PTA) on hygiene and prevention of infections, implementing the e-Bug educational resource. All certified HPs and members of PTAs have been implementing the activities in about 6000 students in 100 elementary schools and about 20 junior high schools, mainly in Athens and Thessaloniki must be divided into chapters. January 20th, 2015 was proclaimed as "Health Day" for schools in Greece and eBug activities were also implemented. In 19 June 2015, presentation of the e-Bug resource to the Inter-Municipal National Network of Healthy Cities - Health Promotion, (http://www.eddyppy.gr/sites/default/files/synantiseisergasias/9_e-bug_a.gennimata.pdf) supported by the Hellenic Society of Chemotherapy led to inclusion of an adaptation of the Antibiotics Section of the e-Bug Junior pack in the Inter-Municipal National Network of Healthy Cities - Health Promotion campaigns to educate teachers on prudent use of antibiotics, in 2016 and 2017, and how we plan to establish and promote an e-Bug School Network.

Figure 2: Inter Municipal National network of Heathy Cities-Health Promotion (W.H.O. accredited body))





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Figure 3: Inter Municipal National network of Healthy Cities-Health Promotion (W.H.O. accredited body) Activities, supported by thw Hellenic Society of Chemotherapy



Schools and teachers are rather reluctant to organize extracurricular activities for students. eBug is known to them but occasionally selected to be implemented. When it is selected, they do not usually publish/present/communicate the activities. We only need one school in Greece to become an “ambassador” and organize a network for teachers and we are currently in search of it.

3. E-Bug Implementation– Presentations, conferences, teacher networks

Elementary and Junior High School teachers had agreed to bring the development and publication of e-Bug educational resource into discussion among Elementary and Junior High School Teachers Associations, respectively, to promote the educational material and website among their members and the schools, BUT in 2009 the fiscal crisis in Greece (recession) occurred and the dissemination was severely affected. The Faculty of the annual “Counselling and Vocational Orientation Certification Programme” for teachers in both primary and secondary schools support our efforts, by agreeing to inform the teachers that attend the course, about the pack and involve them in its implementation, but the programme runs on a voluntary basis. In 2010, the topic “The evaluation of e-Bug as an educational resource in elementary schools”, was assigned to three postgraduate students, as two separate dissertation thesis projects [one at the National School of Public Health (NSPH), and the other at the Department of Pedagogics, (ASPETE)], in Greece, but although both thesis were published there was no follow-up by other students, yet.

September 2009: International Scientific Conference e RA – 4. & SynEnergy Forum (S.E.F.) – 2 Gennimata et al., e-Bug: Educational Resource in Europe. December 2009: Seminar for Elementary and Junior High School Teachers in the Dodecanese Prefecture: Personal Hygiene and Prudent Use of Antibiotics. September 2010 – May 2010: 2nd Junior High School, Pallini,



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Greece, example of a year's project. Student website translation. Poster presentation (An e-Bug Science Fair) in thw embo-febs Spetses Summer School on Host microbes' interactions.

Figure 4: An e-bug science fair

Host - Microbes Interactions

An e-Bug Science Fair

D.Gennimata and the Environmental Group of the 2nd Junior High School, Pallini, Greece

The educational structure in Greece

Age Group	Educational system	Compulsory
0-6	(PRESCHOOL) (0 GRADES)	YES
6-12	(ELEMENTARY) (6 GRADES)	YES
12-18	(JUNIOR HIGH SCHOOL) (3 GRADES)	YES
15-18	(SENIOR HIGH SCHOOL) (3 GRADES)	NO

Microbiology in the science curriculum of schools, relevant to the e-Bug project.

Grade	Topic	Sub topics related to e-Bug
6-7	Science	Parts of the ecosystem
8-9	Science	Agents of disease
10-11	Science	Cells: structure and function
12-13	Science	Human tissues and organs
14-15	Science	Forms of life
16-17	Science	Infectious disease agents

2nd Junior High School, Pallini, Greece

3 CLASSES IN EACH GRADE (A1-A2-A3, B1-B2-B3, C1-C2-C3)
about 25 students in each class

Environmental Group (EG):

- 2 teachers
- about 40 students of B and C grades, in total
- SEP 2009 – MAY 2010: 45 minutes weekly meetings, after school hours, in the school grounds, in the school science laboratory.

e-Bug Science Fair Programme:
(Duration: 10:00 am – 2:00 pm, May the 10th, 2010)

- 6 out of the 8 e-Bug activities (Useful microbes, Hand Hygiene, Respiratory Hygiene, STDs, Vaccines, Antibiotics)
- about 6 EG students preparing each e-Bug activity (posters, photos, experiments, games, hand-outs) and 6 e-Bug stations in the school laboratory
- all 225 school students visited all 6 of the e-Bug stations (4 sessions of about 50 students, in each session)
- about 50 school students (2 classes) divided in 6 groups, visiting each station for 8 minutes, in rotation, in a school hour (about 45 minutes)

USEFUL MICROBES **HAND HYGIENE** **HYGIENE** **STATION ACTIVITY** **VACCINES** **ANTIBIOTICS**

The e-Bug project is led by the Health Protection Agency (HPA) Primary Care Unit in Gloucester, UK and involves a consortium of 18 partner EU countries. Project development was 60% funded by DG Sanco.

In September 2014, the MoE initiated the “Social School” activity. The NSPH participated in this activity, through training and certifying Health Professionals (HP) and members of Parents and Teachers Associations (PTA) on hygiene and prevention of infections, implementing the e-Bug educational resource. All certified HPs and members of PTAs have been implementing the activities in about 6000 students in 100 elementary schools and about 20 junior high schools, mainly in Athens and Thessaloniki. On January 20th, 2015, the day was proclaimed as "Health Day" for schools in Greece and e-Bug activities were also suggested to be included in the festivities. In October 2015, The MoH includes the e-Bug website in a document regarding nutrition of children and in 2017 and 2018, School campaigns by the Ministry of Health (Department of Primary Healthcare, Health Education and Promotion Unit). In the beginning of every school year the NSPH makes a formal request to the ministry of education, in order that the Regional Offices of Health Education are “reminded” of the e-Bug project. In 2018, the Hellenic Centre for Disease Prevention and Control (<https://eody.gov.gr/en/>) included the e-Bug website link among the suggested educational resources and MoH supported activities in schools take place and are disseminated (e.g. <https://blogs.sch.gr/dimagparask/2018/03/29/>).



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The resource is incorporated in educational websites and school websites:

Figure 5: Websites



The resource is incorporated in educational websites and school websites:

4. Challenges but no breakthrough(s): The future of e-Bug

Extracurricular activity in a dense school curriculum. Low student interest in comparison to other projects (e.g. Ecology, Psychology). Minimal feedback from schools and lack of health campaigns coordination. Financial difficulties and social instability in the country. Lack of a national partner and an official e-Bug team. Lack of extracurricular activity in a dense school curriculum, school units that have been merged and shortage of teachers.

In the future our goal is: translation of and participation in other than only the junior and senior e-Bug resources and activities, inclusion of the e-Bug website link in more websites (Ministry of Health, Ministry of Education, Primary Health Care Organization – EOPYY, Hellenic Center for Disease Control & Prevention -KEELPNO), incorporation of e-Bug in the school curriculum, introduction of the e-Bug resource into private schools, collaboration with national Health and Educational Institutions, as key stakeholders.

5. Conclusion

In Greece, Health Education and Promotion on prevention of infections and prudent use of antimicrobials is mainly focused on adults. An educational resource that could motivate children and adolescents to change relative health behaviors was required to fill this gap. In September 2009, e-Bug was launched in Greece and in 2011 the e-Bug website extended the access of



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teachers and students to this resource. Since then, dissemination and implementation activities are various and exciting (Gennimata et al, 2011· Gennimata et al, 2009· Gennimata et al, 2017).

Endorsements from the Ministry of Education (MoE) and the Ministry of Health (MoH) have been acquired since 2009 and recently renewed. Junior and Senior resource packs (2100 copies of each) have been distributed to all regions of the country, through Health Education Regional Offices of the MoE. In the beginning of each school year, teachers are «reminded» by the MoH that e-Bug is included in their lists of available resources for all schools, in printed form and online. The student website is translated and updated regularly and often visited by children and teenagers, as a resource for school projects and amusement activities.

Furthermore, e-Bug is hosted as a link in webpages by various relevant public and private organizations and has been a reference for institutions, societies and health promotion campaigns initiatives.

We believe that the future of e-Bug in Greece and therefore the maintenance of the relative website relies a) on the creation of a teachers' network that will coordinate implementation and dissemination activities and b) the incentives that are offered to professionals in education and counselling, to adopt implement and disseminate the resource.

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References

- [1]. Lecky DM, McNulty CAM, Adriaenssens N, Koprivova Heretova T, Holt J, Kostkova P, Merakou K, Koncan R, Olczak-Pienkowska A, Brito Avô A, Campos J, Farrell D. and Touboul P on behalf of the e-Bug Working Group. 2011. Development an educational resource on microbes, hygiene and prudent antibiotic use for junior and senior school children. *Journal of Antimicrobial Chemotherapy* 66 Suppl 5: v23–v31.
- [2]. Lecky DM. e-Bug. 2011. Presented in EU Projects for Teachers session of the Scientix Conference "The Community for Science Education in Europe", 6-8 May 2011, Brussels, Belgium,



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[3]. World Health Organization Report on Infectious Diseases. *Overcoming Antimicrobial Resistance 2000. World Health Organization Annual Report.* <http://www.who.int/infectiousdisease-report/2000/> Accessed 26th November 2008).

[4]. Timmis et al. 2019, *The urgent need for microbiology literacy in the society.* Environmental Microbiology (2019) 21(5), 1513–1528. doi:10.1111/1462-2920.14611

[5]. Gennimata D., Merakou K., Barbouni A., Kremastinou J. (2011). Implementation of the e-Bug project in Greece. *Journal of Antimicrobial Chemotherapy.* 2011; 66 Suppl 5: v71– v73

[6]. Gennimata D., Merakou K., Barbouni A., Lecky D. M, McNulty Cl. AM, Kalouri O. and Kremastinou J. "e-Bug: Educational Resource in Europe", (Presentation C.4.4. Saturday 26-0909). *e RA – 4, International Scientific Conference. The Conference for the contribution of Information Technology to Science, Economy, Society and Education.* Spetses, Greece. 24 - 26 September 2009

[7]. Gennimata D., Merakou K., Barbouni A., Young V, McNulty C, Nicolau A.I., Langsrud S., *Innovation in Food Hygiene and Safety: Could education play a role?* Accepted oral presentation, 7th European Food Safety & Standards Conference, Athens, 13-14 November 2017