CREATING E-LEARNING COURSE ON BIODIVERSITY IN THE EUROPEAN PROJECT KEY TO NATURE

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*The paper is dedicated to Prof. D. Temniskova
on the occasion of.her 80th jubilee*

Abstract: An e-learning course in biodiversity was conducted for the first time among universities in Bulgaria in Shumen University. The aim was to use the opportunities provided by the project Key to Nature (sponsored by the EC Programme *e*ContentPlus) and the e-learning platform Moodle to develop and support the delivery of specialised training courses in Higher Education. In order to realise this goal the authors have developed a sample course in Botany. The course was conducted in the period September 2010 – February 2011. Thirty six students studying biology participated in the course. The results show that it provides an accessible option for remote collection, publication and verification of information of different nature and sources. The course proved the effectiveness of e-learning as a form of self-study that complements traditional forms. In the future, we expect an increase of the role of e-learning in Bulgarian universities, and even to replace some (parts) of the conventional study forms.

Key words: botany, electronic key, trees, shrubs, Moodle

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INTRODUCTION

Key to Nature was a project under the European Commisssion (EC) programme *e*Content*Plus*. The project duration was from 2007 to 2010. It involved 14 partners from 11 European countries. The aim was to achieve a common European approach to teaching topics in biodiversity at all levels of education (http://www.keytonature.eu). The main objectives of KeyToNature were:

- Increasing the access and simplifying the use of e-Learning tools for identifying organisms.
- Addressing the issue of interoperability among the many educational tools devoted to biodiversity across Europe.
- Optimizing their educational efficiency and increasing their quality for educational purposes.
- Adding value to them by providing multilingual access.
- Suggesting best practices against barriers that prevent use, production, exposure, discovery and acquisition of educational tools in the biodiversity field.

To achieve the objectives of the project partners presented their electronic databases that are related to biodiversity. One part of the partners who have taken this step was:

- Faculty of Life Sciences, The University of Trieste, Italia (coordinator of the project)
- British Natural History Museum, London.
- "ETI-Bioinformatics" – Dutch organization funded by UNESCO.
- German Federal Research Centre for Biology.
- Real Jardín Botanico (of the Spanish National Research Council).
- Slovenian Museum of Natural History.
- German and Estonian universities with rich electronic databases for biodiversity.

The project worked in two main areas: software-technological and educational.

The software-technological direction was aimed at reconciliation of existing partner electronic databases for biodiversity and providing uniform access to them.

The educational direction was associated with the development of best practices and pilot testing for meaningful and full utilisation of the potential of the databases in the learning activities of primary and secondary schools and universities. Three Bulgarian universities joined the project as associate members: Sofia University "St. Kliment Ohridski", Medical University – Sofia, and University of Shumen "Bishop Konstantin Preslavski".

An interactive portal for schools and universities was developed during the project. The universities' part of the portal offered opportunities for free use of a number of electronic identification keys (e-keys) in the fields of Botany, Zoology, Mycology, published in different languages, mainly in English. The advantage of

e-keys is that they can be used on a portable computer (laptop) with Internet access, or with a CD-version of the respective e-key. Versions have been developed for mobile phones as well.

MATERIALS AND METHODS

An e-Learning course was conducted by the authors of the article during the period September 2010 – February 2011, the first semester of the academic year in Bulgaria.

The aim was to use the opportunities provided by the project "KeyToNature", funded by the EC *e*ContentPlus programme), and the e-learning platform Moodle (http://k2n.dmaster.org/moodle-new/, Cole & Foster 2008) to create specialised courses and to conduct training through them. To realise this goal, the authors have developed an exemplary course in Botany (Dendrology), (currently available at http://k2n.dmaster.org/moodle-new/course/view.php?id=45, access as a "Guest"). Before to run the course, described in the current article, an appropriate national teacher training was conducted for selected Bulgarian schools and universities (MIHNEV & RAYCHEVA 2010).

Thirty six first-grade university students participated in the course from two different specialties: "Biology and Chemistry", and "Physics and Biology". Each student had to gather information for a tree or shrub species found in the park of the University of Shumen. The tasks were formulated in a special page on the platform. A special electronic key (e-key) for identification of trees and shrubs in Bulgaria (in Bulgarian) was used, developed under the project (NIMIS ET AL. 2010). The key was developed in three versions – as online Internet key (http://dbiodbs.units.it/carso/chiavi_pub21?sc=324), in a CD-version, and in a version for mobile phones.

A final result that has been aimed at, was the development of a profile of plant species, which had to be published in the e-learning platform. At the end of the course each student completed an electronic "opinion questionnaire", aimed to assess the quality of the course by end-users point of view. The COLLES instrument (Taylor & Maor 2010) was used for processing the results of the survey. The COLLES survey consists of 24 statements grouped into six scales: relevance, reflective thinking (self-reflection), interactivity, support of teacher support from other participants in the course and interpretation. The specific questions, the research findings, and the grouping by categories can be viewed in the online edition of TAYLOR & MAOR (2010).

The course ended with a final assessment, which was included in the formation of the final exam mark of the Botany course.

RESULTS AND DISCUSSION

Students who were enrolled in the course received a personal password by the administrator of the course MR. PENCHO MIHNEV. Of course, then they had the right to change it. The course was publicly accessible by non-participants who were able to enter as "Guests". Unlike the students, they were unable to publish information, and to see the submitted student assignments.

The work assignments that were given to the students were two types: fieldwork and cameral work. The cameral work was divided in two phases: preliminary (training) and individual (execution of tasks). The fieldwork was carried out between the two phases. DR. DIMCHO ZAHARIEV headed, commissioned and oversaw the proper fulfilment of the work.

The course included several themes. Different study tasks were assigned to each theme, namely:

Theme 1. Working with an electronic key

Activity 1. Identify one tree or shrub species.

Use the electronic key on trees and shrubs in Bulgaria. Link to the electronic key is included.

Activity 2. Fill in the worksheet.

Download the file that is attached to the theme. Link to the worksheet file is included.

Theme 2. Collecting information about the species of place

Activity 1. Take photos of the tree or shrub species, assigned to you: habitus, twig with buds and leaves, leaf, flower, inflorescence, fruit.

Activity 2. Determine the location of the tree/shrub.

Use GPS or interactive Internet map showing the coordinates providing the location (eg. GoogleMap). Link to GoogleMap is included.

Theme 3. Collection of additional information on the species

Activity 1. Gather text information about species:

    1.1. Spreading.

    1.2. Morphological description.

    1.3. Period of flowering and fruiting.

    1.4. Importance.

Use books from the library and materials from the Internet.

Activity 2. Gather information on the type of pictures. Use images from the web.

Activity 3. Gather mapping information on the species:

    3.1. Spreading in Europe.

    3.2. Spreading in Bulgaria.

Theme 4. Storage of collected information

Activity 1. Submit the completed worksheet to the Moodle platform. A submission link is included.

Activity 2. Fill in a Data Base record with your collected data. Use the link provided in the theme.

Activity 3. Application of the identified species' location coordinates on the map. A link to the map is included.

Theme 5. Create a profile of the species.

Activity 1. Create a profile of your plant. Use the template file "Profile of the species".

Activity 2. Develop the profile of the species as a multimedia product.

Activity 3. Send the file by using the Upload button, related to the theme.

Theme 6. Creation of an electronic key

Activity 1. Create an electronic key of trees and shrubs in the Park of Shumen University. Use The Editor of electronic keys. A link to the Online Editor of e-keys is included.

Activity 2. Fill in the new key information collected by you.

Activity 3. Save created key to your computer.

After the last topic a link to the opinion survey is included that each student must complete after the completion of his work in the e-Learning course.

The preliminary cameral work consisted of the following:

1. Training to work with electronic keys. The students were divided into 3 groups by 12 persons each. The training was conducted in a computer lab. During the training several different plant species were identified by using the e-key. As a result, the students discovered that work with electronic key is much easier than the use of conventional printed keys.

2. Training for mastering the steps to perform the tasks. It was necessary because e-learning is still not very much used in Bulgaria. During the training the opportunities which it provides were shown. The basic steps that should be followed in order to meet the objectives of the course were demonstrated to the students. To answer the questions that may arise during their independent work a contact e-mail of the teacher was provided to all participants.

Fieldwork consisted of determining the species identification of tree or shrub species. The place of work was the park in front of the main building of the University of Shumen. Each student had to work with a separate species, different from that of all other students. Who exactly will be the plant species was determined randomly by the students themselves. The identification of plant species was performed by using the electronic key installed either on laptop or on mobile phone. The students filled out "in place" in the park a worksheet with the most important morphological features of the studied individual plants. They took photos of vegetative and/or generative organs of "their" species. They were asked to describe also as additional information the specific habitat around their plant and to determine the presence or absence of relationships with other organisms (plants and animals) in its surrounding environment.

The individual cameral work included collection of textual and illustrative information in order to develop a profile of the plant species. The profile included the following data: Latin name of the tree or shrub species; its Bulgarian name; name of the family to which the species belongs; classification with level of detail at the student's discretion; photos of the tree/shrub (minimum 2 made by the student, and 2 from other sources); description (morphology, habitat, altitude, spreading in Europe and in Bulgaria, preference for soil conditions); importance for the humans; interesting facts; more information (personal comments); description of the resources used during the work (electronic keys, online resources, print resources).

The information required had to be from several print and electronic sources.

As an additional benefit to students was offered the proposal to develop PowerPoint presentations of their identified plant species that could bring to them additional award points.

The collected data were entered in an interactive geographical map embedded into Moodle and into prepared multimedia database for the course.

The final students' opinion survey included 48 questions, divided into six groups: relevance, reflective thinking (self-reflection), interactivity, support of teacher support from other participants in the course and interpretation. The possible answers to each question were as follows: "almost never", "rarely", "sometime", "often" and "almost always". At the end of the survey the students had to enter the time required for its completion. There was a possibility to also add a free-text comment at the end of the survey.

CONCLUSION

The delivery of an e-learning course on biodiversity was performed for the first time in Shumen University among universities in Bulgaria. The results showed that the course can be used successfully for remote collection, publication and verification of information of different nature. The electronic course offered a number of advantages as a form of individual work for the students in comparison to the conventional course forms used in Bulgarian Universities. The course was characterized with attractiveness: the used tools for learning and studying were high-tech, similarly to those that students use in their everyday life. Another feature is the achieved learning dynamics: the variety of tasks that were allocated throughout the course. The third course advantage was the accessibility: students performed the tasks at a satisfactorily level. One of the most important features was that the electronic course provided opportunities for creativity that took the learning and training to a higher level. In the future, we expect that the role of e-learning in Bulgarian universities will increase and even replace some (parts) of the conventional study forms.

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