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User needs for interactive identification tools to organisms employed in the EU-Project *KeyToNature*

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Abstract — The EU-funded project *KeyToNature* is developing and optimising interactive tools for identifying organisms, making them suitable for being usable in the field of formal education across Europe. To define the requirements of the target audience, research was conducted in 11 partner countries during an initial project phase. Teachers and lecturers from primary schools to university level were asked to express their views about selected existing identification tools in a qualitative survey. The target audience was asked about perception, strengths and optimisation options, output channels and pedagogical application fields. The results showed that the adaption of the tools to the range of local organisms and the native language of the audience represents a fundamental step.

Index Terms — education, EU project, identification keys, *KeyToNature*, user needs.

1 Introduction

The 3-year EU-funded project *KeyToNature* deals with interactive tools designed to identify organisms. These software and web-based tools are to be incorporated within educational structures with the objective of improving knowledge of biodiversity. *KeyToNature* aims to provide easy access to identification tools, to optimize their educational efficiency and ease of use. A further objective is to provide for the interconnection of these tools, so that multilingual access is possible and usage across Europe as a whole is enhanced.

A total of 14 project partners from 11 countries – Austria, Belgium, Bulgaria, Estonia, Germany, Italy, the Netherlands, Romania, Slovenia, Spain and the

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United Kingdom – are participating in this project [1], [2].

2 Background Situation

The success achieved through the use of educational tools in the classroom is determined to a large extent by the competence of the teachers and the pedagogical concepts they employ [3], [4]. In their international review of education, for example, Kugeman & Fisher [5] established that the systematic involvement of teachers is crucial for the success of ICT tools – from setting up the learning processes and creating pedagogical concepts at the start, to reviewing and verifying the contents and results provided by the learners.

During the *KeyToNature* Project start phase, a state of the art presentation of the tools was undertaken [6]; a selection of the tools that were to be used for research purposes was put forward for review.

As many aspects of the existing tools and prototypes for pedagogical use have not previously been considered in the international context, we decided to conduct a user requirements analysis as a first step towards involving teachers in the development of the identification tools.

This paper presents the results of our user requirements survey in connection with the *KeyToNature* project. Our main objective was to identify specific details of how the tools are perceived. What do teachers think about the general concept of the tools and their use within the curriculum? Which didactic framework is suitable for the identification tools and how can they be implemented in lessons? Which medium (e.g. mobile phone, website) is perceived as most appropriate?

3 Research Design

In order to meet the target groups' needs, we decided to concentrate on a user-oriented design approach [7]. In particular, data on the pedagogical and educational requirements, as these relate to the identification of biodiversity were gathered by means of qualitative analysis in all partner countries.

The target audiences were lecturers who were recruited by the project partners in their respective countries. At each educational level - primary, secondary and university - focus groups were formed in all 11 participating countries in order to obtain input for all end-user segments [8].

Where it was not feasible to form focus groups, qualitative interviews – face-to-face, per telephone or email – were used as an alternative [9]. The tools were presented and afterwards discussed. Specific guidelines that covered the survey questions were employed. The collected data were subsequently analysed by the partner countries and summarised in a detailed report.

A total of 219 teaching staff participated in the survey that was conducted in the period October 2007 to February 2008. Of these, 152 were interviewed within focus groups, 33 were surveyed in face-to-face interviews and 11 were surveyed by means of email.

4 Tools Presented

The material under consideration consisted of a collection of existing tools: these were presented to the target audience, where possible, either in form of online prototypes or as concepts using PowerPoint slides - depending on their development status.

The identification tools (i.e. software-based identification keys) use different techniques to identify organisms. These include dichotomous keys which provide identification based on only two different possible selection options per stage, and multi-criteria keys which enable users to select several characters at once. Another option is to provide a free input field so that users can search for results on the basis of their own entered search criteria (e.g. taxon name).

The presented tools were:

1. Walking with woodlice (primary school level): a simple web-based key to woodlice in the UK with a colourful interface.
2. Key to Trees and Shrubs (primary and secondary school levels): a web-based tool that makes extensive use of pictures and graphics.
3. Earthworm Survey (secondary school level): a dichotomous key that uses PowerPoint slides.
4. Key to the Flora of Val Rosandra (university level): this employs the same software and UI as the “Key to Trees and Shrubs”, but includes substantially more species (c. 1000).
5. E-Flora iberica (university level): a web-based key to the plants of the Iberian Peninsula with free text search option and a powerful browsing mode.
6. Bumblebee (university level): a key to bumblebees in the form of an interactive flash application.

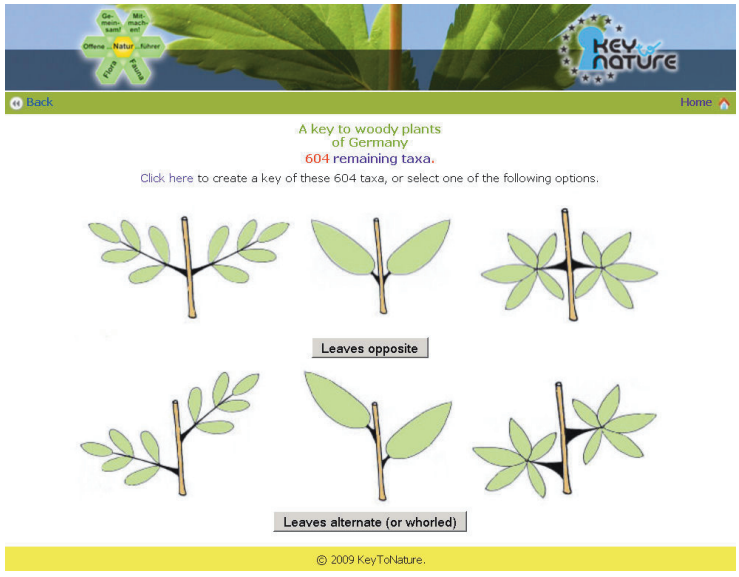

Fig. 1 – Screenshot of a dichotomous key to woody plants (with options “leaves opposite” and “leaves not opposite”).
The current versions of the tools can be viewed at www.keytonature.eu.

5 Results

Perception of interactive identification tools: The dichotomous keys were perceived as an easily understandable, target group-oriented concept. Those surveyed considered that pupils/students would find this tool easier to use than the multi-criteria tools as they would be required to deal with less information at one time. The multi-criteria selection option should be provided for more advanced pupils/students, also because there was only limited pictorial information on individual characteristics available. The free text input option also met with a positive response, but was considered to be a more difficult tool to use for identification purposes, requiring more knowledge by the user with regard to the criteria that are crucial for differentiation.

Adaptation to the educational level: Our survey population considered that the woodlice key and the earthworm key would be suitable for a younger target group if the present application were improved - translations to native language and age-specific design. The idea of organism identification was generally seen as suitable at all levels, but the texts and designs needed to be tailored to the specific target audience.

Suitable media: In general, the fact that the target audience would need to be able to use a computer was not seen as problematic – even at primary school level – although these are not always available at all schools.

With regard to the media format, the CD-ROM was liked best by our survey population because this ensures there is no distraction by other web sites or services. Nevertheless, the web application was also perceived as positive in view of the better availability of updates, the platform it provides for online activities and its community-related aspects, such as the option for links with discussion forums, specialists etc. The mobile versions (for mobile phones or PDAs) were seen as outstanding in comparison with the other media because they can be used in the field; however, negative aspects were cited, such as the cost of data transfer and the limited screen size that makes it difficult to recognise organism details in images.

Pedagogical framework and educational applications: Several potential applications were identified; one that was frequently mentioned was the use for project work (at home, in the field or at school) at the primary and secondary school level, as current school curricula do not provide sufficient time to cover identification of organisms. Consequently, elective subjects would provide a perfect environment to work with identification tools. It was suggested that these tools could be used to present group projects in front of the class, thus helping improve pupils' presentation skills. However, one crucial aspect specified was that pupils at primary and secondary school level would need to be first instructed in the use of the tools by a teacher.

6 Conclusions

Several recommendations for optimisation based on the proposals made by our survey group were subsequently implemented. However, the survey itself had certain limitations. The tools were presented to the survey group only once,

and the individual teachers and lecturers were not given the option of trying out the tools over the long term in their educational institutes. Within the project progress, hundreds of tools were subsequently adapted to local requirements; local organisms were included and additional languages were integrated in the system with the help of some of the teachers and other associated members of *KeyToNature* who had been recruited for the project. Higher quality, high definition images and photographs and more interactive features were also added. At a subsequent phase of the project, an end-user evaluation was conducted by means of trials with students as subjects in order to investigate practicability, cognitive level of difficulty, and look-and-feel of the tools. A generally accessible platform was put in place in order to provide an arena for communication and for showcasing of ideas for the educational use of the tools. This has the potential to be further expanded and developed in future. Teachers and students were encouraged to participate by inputting descriptions, nomenclature and ecological data, distribution maps, images, sources and feedback. The purpose was to establish an international network of those interested in biodiversity and promote the dissemination of knowledge in this field.

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