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TITLE: The experience of “A Primer in Biodiversity Issues”

Subtitle: Promoting an autonomous learning based on motivation in undergraduate students of Teacher Training

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1. **ABSTRACT IN YOUR PAPER’S LANGUAGE** (if not English): 500-700 characters
2. **ABSTRACT IN ENGLISH:** 500-700 characters

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This work presents the experience of “A primer in Biodiversity Issues”, an optional subject in the 3rd course of the Degree in Teacher Training of the *E.U. de Educación de Soria (Universidad de Valladolid)*. The subject was programmed to promote autonomous learning based on motivation. Students showed a natural bent towards Nature, but not a strong naturalistic formation, so it was necessary to provide them with basic knowledge in biodiversity issues. Afterwards, the teaching-learning process was guided by their preferences and interests, since they freely decided the topics on which developing tasks, commonly educational projects or lectures.

3. **KEYWORDS** in your paper’s language (if not English): 3 / **KEYWORDS** in English: 3
BIODIVERSITY, MOTIVATION, TEACHER TRAINING

4. **FIELD OF KNOWLEDGE:** Indicate the subject area of your proposal:

- Arts and Humanities
- Sciences
- Health Sciences
- Social and Legal Sciences
- Engineering and Architecture
- More than one area

5. **SUBJECT AREA:** Specify the subject area you propose for your paper:

- Evaluation and Institutional Quality

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- Cooperation In and For Knowledge
- Innovation In Higher Education
- **Autonomous Student Learning**
- Internationalization of the University

The Scientific Committee reserves the right to decide the final area of the proposals.

6. PRESENTATION CATEGORY:

- **Oral Presentation**
- Poster Presentation
- Electronic Presentation

The Scientific Committee reserves the right to decide the final presentation category.

7. DEVELOPMENT: 25.000 – 35.000 characters (with spaces)

This work is aimed to present the experience of “A Primer in Biodiversity Issues”, a subject which has been developed for the first time in the first semester of the current academic year, 2011-2012. “A Primer” is a recently programmed, optional subject in the 3rd course of the Degree in Teacher Training (*Grado Maestro -o Maestra- en Educación Primaria*) of the *E.U. de Educación de Soria (Universidad de Valladolid)*, taken by students aiming to obtain the Mention in Social Sciences, Experimental Sciences, and Mathematics. The experience of developing thus subject for the first time is considered

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novel and of interest since: (1) “A Primer” was taught in English; (2) autonomous learning based on motivation was promoted.

a) Objectives

The experience of “A Primer” is presented here because an overall objective for the subject was promoting autonomous learning based on motivation. Moreover, such approach should allow achieving three main types of objectives:

A. Content-oriented objectives: In the frame of the Mention in Social Sciences, Experimental Sciences, and Mathematics of the Degree in Teacher Training, it was considered relevant to offer a subject dealing with biodiversity, whose content-oriented objectives would be:

- to define “biodiversity” and to treat the genetic, taxonomic, and functional levels of it
- to review the scientific hypotheses and theories on the origins and evolution of biodiversity
- to dimension the magnitude of biodiversity, and to consider its geographical distribution across the planet Earth
- to describe biodiversity in the frame of our biogeographical context and from a top-down approach, starting by areas of the world characterized by Mediterranean climate and ending in the Iberian Peninsula
- to present main groups of living organisms (basic taxonomy)

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-to identify what type of human actions pose a threat to biodiversity

B. Ability-oriented objectives: Since students of “A Primer” are taking a Degree in Teacher Training, this subject should also be useful for:

-improving the abilities to select and use educational resources

-improving the abilities to generate educational resources (i.e. the abilities to decide what information to transmit and to plan how to do it, by considering the educational context in which the teaching-learning process is going to occur, as well as students’ characteristics such as number and age)

-improving the communication capability in English, and particularly in topics related to natural sciences

C. Attitude-oriented objectives: Finally, it was considered relevant to enhance students’ environmental consciousness, in order to contribute in preparing the next generation of teachers to educate children in respect to nature.

b) Description of your work

Planning:

The first necessary step was planning the subject, which basically consisted in

-defining the above-mentioned content-oriented objectives

-deciding and selecting the type and amount of information that was necessary to present in regular lectures in order to provide students with a basic knowledge on biodiversity

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issues (allowing them to further develop their teaching-learning process basing on personal preferences and interests)

- designing several activities aimed to promote students' autonomous learning
- outlining a time schedule where contents and activities were specified, considering that a 1 hour-long class was available for theoretical contents and a 2 hour-long class was available for practical activities on a weekly basis. Moreover, and in particular weeks along the course, 1 or 2 hour-long classes were available as seminars. Remarkably, practical classes devoted to a certain topic should always occur after theoretical lectures on required theoretical contents had occurred.
- defining evaluation, in particular how and what was going to be evaluated. In particular, it was decided to conduct a learning-oriented evaluation in which students could actively participate, and to evaluate ability-oriented objectives by means of tasks, consisting in “educational projects” or “lectures” (Gayford 2004).

Development:

Introducing the experience to students

The first class was devoted to present this new subject -and also the teacher- to students. Remarkably, it was clearly stated that:

- (1) regular lectures would be conducted in English,
- (2) the subject would include several compulsory activities consisting in “educational projects” or “lectures”, and aimed to promote autonomous learning. Thus, the subject would require of a continuous and effective engagement by students.

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Time schedule for the whole semester, including both temporal planning of theoretical contents and of practical tasks, were detailed. Evaluation methods and aspects that would be considered for evaluation were also exposed; given the initial reticence of students with respect to the use of English, it was negotiated that tasks could be conducted in Spanish, despite the use of English would be rewarded in final evaluation.

Promoting autonomous learning based on motivation

The educational literature is replete with alternative interpretations of what is meant by autonomous learning (Benson and Voller 1997). In this experience, autonomous learning was taken as characterized by personalization, and self-directedness. The idea that self-directed learning is central to effective engagement with the learning process is well-recognized (Bryson and Hand 2007). On turn, effective engagement is an essential requirement for achieving attitude-oriented objectives such as improving environmental consciousness (Dreyfus et al. 1999, Birut 2006), as it was the case in “A Primer”.

Autonomous learning was promoted by basing a considerable part of the subject on the development of tasks by students; such tasks overall accounted for 60% of the final student’s grade. Theoretical lectures were used to provide with basic knowledge in biodiversity-related issues (see *content-oriented objectives*), and practical lectures were invested in tasks, consisting basically in “educational projects” or “lectures”. Tasks were initially proposed by the teacher in an open manner: only some guidelines related to procedures and/or educational context were provided to students, who were free to decide contents –i.e. what they were most interested in learning. Guidelines for the different tasks varied (for instance “this is an individual *versus* a collective task”, “prepare a

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theoretical *versus* a practical lecture”, etc. see *tasks description* below) to: (1) provide with a range of possibilities and situations allowing students to experience when they felt more comfortable, competent, motivated, etc., and (2) avoid promoting certain learning styles to the detriment of others (Ajzen 2005).

Task were proposed, initiated, and partly developed during the practical lectures, and extra dedication by students “at home” was also required to complete them. The professor provided with effective support and guidance during practical lectures both in a collective and in an individual manner; moreover, students were encouraged to solve their doubts and discuss their interests in an individual manner during tutorships.

Tasks were evaluated soon after handling in relation to several aspects that had been previously communicated to students, namely: didactics, contents, originality, amount of work, and language (the use of English was not compulsory but rewarded), which were considered together in order to provide with a global grade for the task. In every case, students were congratulated in relation to the strong points of their work, and provided with suggestions for the improvement of the weak points. General comments on the overall performance of the group in a certain task were exposed to and discussed with students. Learning-oriented evaluation was promoted by offering students the chance to improve a certain aspect of their task whenever a minimum quality level was not achieved, after providing them with clear and significant information on the type of improvement that was expected. Lastly, it is remarkable that a process of negotiation with students was conducted along the whole subject in relation to tasks, for instance with respect to the class time devoted to each of them, in relation to handling deadlines, etc., which was considered of the main relevance in the frame of a teaching-learning

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experience aiming to promote autonomous learning. In such frame, students are expected to exert their capability to take decisions about their learning process not only in relation to their main interests and motivation, but also in the conditions that they require for their adequate performance, such as times and ways of organization (Shihusa and Keraro 2009, Baumgartner and Zabin, 2008).

Tasks description and evaluation

Task 1: Biodiversity as an educative resource

This task was proposed after 5 hours of theoretical lectures devoted to define “biodiversity” and to treat the genetic, taxonomic, and functional levels of it (2 hours); to review the scientific hypotheses and theories on the origins and evolution of biodiversity (2 hours); to dimension the magnitude of biodiversity, and to consider its geographical distribution across the planet Earth (1 hour).

Guidelines:

- Work alone
- General topic is biodiversity, and suggested particular topics are: biomes of the world, plant communities along an altitudinal gradient, biodiversity in hotspots
- Prepare an educational project
- It should take a maximum time of 2 hours to develop
- You are free to choose: how many students, how old they are, etc.
- Steps: Planning your project, looking for the type and amount of information that you need, creating your project by considering selected students’ characteristics
- Dedication: 4 hours at class + work at home

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Comments to task 1:

This first task was proposed to be individually conducted as a manner to allow every student to show its own interests and styles, and thus to allow the professor to become familiar with every student. The overall performance was considered alright for a first attempt; however, a number of students felt uncomfortable in relation to defining the many open aspects, and would rather have preferred working on topic clearly defined by the professor and in a much directed manner. A general lack of practice in planning was observed: students tended to start looking for information without having previously defined the guidelines of their projects. This aspect was underlined by the professor both at an individual and collective level.

Task 2: Mediterranean ecosystems as an educative resource

This task was proposed after 2 hours of theoretical lecture devoted to define the Mediterranean climate, identify the 5 regions of the world showing Mediterranean-type ecosystems, and outlining the main characteristics of each of them.

Guidelines:

-Work in pairs; you can choose your partner

-Topic: choose one of the following options:

- (1) Which are the climatic characteristics that share the different Mediterranean areas of the world,
- (2) Which are the different types of ecosystems found in Mediterranean areas of the world;
- (3) Which are the characteristic plant communities of Mediterranean areas and why;

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(4) Whatever you want about Mediterranean areas

-Design a 1-hour long activity for a group of 13 people that are 11 to 12 years old

-It must be a practical activity

-Dedication: 2 hours at class + work at home

Comments to task 2:

It was considered adequate that this second task would be conducted by freely-chosen pairs, which commonly constitute a comfortable “work unit” for students. Given the experience of task 1, it was also considered convenient to provide with several options in relation to topic, which -despite being very broad- could help students in their process of decision. In this case, the type of educational project was defined as “practical activity”. The overall performance was good in relation to didactics, but poor in relation to contents and amount of work. This might be at least partially attributable to two facts: only a 2-hour class was dedicated by the professor to provide with effective support and guidance, and a practical activity was requested, likely making it easier to focus on the “form” rather than on the “contents”. The low quality of tasks in relation to contents and amount of work were discussed by the professors both per “work units” and with the whole group; improvement of the task was required in some cases.

Task 3: Biodiversity in the Iberian Peninsula as an educative resource

This task was proposed after 2 hours of theoretical lecture devoted to treat geographic, climatic, and topographic characteristics of the Iberian Peninsula, as well as main landscapes, forest types, and forest species.

Guidelines:

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- Work in groups of 4 people; gather freely, the teacher will help if required
- Contents: choose one of the following options:
 - (1) Shrublands of the Iberian Peninsula
 - (2) Mammals in whatever ecosystem of the Iberian Peninsula
 - (3) Birds in whatever ecosystem of the Iberian Peninsula
 - (4) Fishes in whatever ecosystem of the Iberian Peninsula
 - (5) A type of forest, in detail
- Prepare a theoretical lecture of 25 minutes for a group of people from 12 to 13 years old
- Dedication: 4 hours at class + work at home
- You will expose it to your classmates

Comments to task 3:

After the comfortable experience of working in pairs, the big groups made of 4 to 5 people –not always voluntary, since in some cases it was necessary to re-gather students- for task 3 made coordination among members more difficult. This fact was generally evidenced in most groups: the task was divided into parts for the individual work of each student, and parts were afterwards put together -just on time for the presentation-. Contents were generally well-coordinated among group members, but the several parts substantially differed and had the personal impromptu of every student. The overall performance improved, since students had already clearly understood what was expected, and what was considered a “good job”. A participative evaluation was conducted in this case; students were asked to express what they thought that were the strong and weak points of the tasks conducted by groups. Moreover, and given the above-mentioned, this

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task was also evaluated by the professor for every individual student, basing on the theoretical contents that he/she prepared, and his/her oral exposition.

Task 4: Integrating contents: Design an environmental itinerary

The last task of the course was proposed when most theoretical contents had been treated, and in particular, main groups of living organisms (basic taxonomy) had been presented. It was considered convenient to propose a task whose nature would promote integrating the many different contents related to biodiversity issues that students had been dealing with.

Guidelines:

- Work in groups of 3 people.
- Design an “Environmental Itinerary”. It consists in a circular path to walk or bike that takes 1 hour and is used for environmental education purposes. Several stops need to be defined along such itinerary, where different environmental information will be provided by the guide/teacher to the public/students.
- Public/Students: a group of 15 people; the range of ages is up to you.
- Dedication: 4 hours at class + work at home
- You will need to expose it in English to you classmates.
- Steps:
 - (1) Choose a place which is interesting for you, and which you can visit by your means.
 - (2) Design a circular itinerary, and draw it on a map (the professor will review it).
 - (3) Decide which stops can be interesting along such path; take pictures on them, and elaborate the environmental information that you would explain to the public.

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(4) Present a document to the professor on all that

Comments to task 4:

This was the last task that students conducted along the course, so they already accounted with previous experience in the processes of deciding, planning, looking for information, reading, understanding and elaborating such information, and finally presenting it to the rest of classmates. This task anyway entailed difficulties, notably its really practical nature, and the compulsory use of English. Many students needed assessment on which nearby areas could be interesting, and on how to deal with the design of the itinerary. The overall performance was excellent, and revealed -in general- the achievement of a very good progress in students' abilities along the course. Notably, it also reflected very clearly the students' natural preferences and personal impromptus.

Results' assessment

The experience of "A Primer in Biodiversity Issues" was assessed from two different perspectives: students' experience and students' results.

To evaluate students' experience, a questionnaire on course experience was used. In particular, it consisted in an adaptation of the "Student Course Experience Questionnaire" (SCEQ), from the Institute for Teaching and Learning of The University of Sydney, conducted with permission by the Autonomous University of Barcelona, and which was only very slightly modified to fit better with this particular case (see Annex 1). At the end of the course, students were asked to assess different aspects of the course by qualifying 3 to 4 statements per aspect along a scale from "strongly disagree" to "strongly agree". Such statements were always set in a positive manner, for instance "I found the course

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intellectually stimulating”, or “The professor made me felt welcome when I asked for help”.

Overall, and basing on the results of such assessment, students experience through the course can be considered highly positive. In more detail:

- There was no disagreement with any of the statements by any of the students. All answers ranged along the scale from “neutral” to “strongly agree”.

- Indeed, “neutral” was the less used degree, accounting for less than 5% of opinions in all but 3 aspects.

- More than 50% of students answered “I agree” to statements related to learning, contents, organization, interaction with the groups, and exams. This fact can be interpreted as more than half the students being satisfied with respect to the interest and the organization of the subject, as well as with the interaction among the professor and the students.

- More than 50% of students answered “I strongly agree” to statements related to enthusiasm and personal attitude, what can be interpreted as more than half the students being highly satisfied in relation to professor’s style and personal attitude in class.

- The initial level of interest in the matter was low or neutral in 67% of students, and was high of very high in 72% of students at the end of the course.

- Some positive aspects of the course underlined by students were: “Freedom in tasks, it improves motivation”, “Good combination of theory and practice”, “Interesting for a future teacher”, “Very complete subject”, “I enjoyed learning-oriented evaluation”, “Flexibility in relation to timing and others”.

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Students' grades were also considered as indicators of efficiency in the teaching-learning process. They were calculated basing on objective indicators, such as the grades obtained in every task and in the exam on theoretical contents.

Overall, and basing on the grades, the teaching-learning process can be considered efficient. In detail:

- Over a total of 24 students, only 2 students did not pass the subject. In fact, they did not follow the whole process, since they did not conduct some of the tasks.
- Those students who followed the whole process of the subject were all able to pass it.
- Over the total, 41% just passed the subject, 46% performed well, and 13% performed particularly well.

c) Concluding remarks

Size is important: The students that took “A primer in Biodiversity Issues” were a total of 24, a number small enough to allow for personal support and effective guidance by the professor, as well as to allow for certain activities that require time (such as oral presentations). Big groups are not suitable for experiences like this –unless the professor has all the time to dedicate to it!-.

Does everybody prefer freedom?: In fact, some students perform very well and get really involved and motivated when they are allowed to decide on several aspects of their learning process, particularly on topics of interest and on organization, whereas and others feel more secure when decisions are taken by another person (i.e. the professor). It

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may be interesting to ask them whether they prefer freedom or not (despite it seems difficult to be honest in answering to it?)

Yes, you can: Positive reinforcement was continuously given to students, since the evaluation of every task involved personally congratulating them in relation to the strong points of their work. Moreover, the professor tried to provide with so much effective support and guidance as required by every single student. In some cases, this had very positive consequences; some students performed over their usual grades –and were particularly happy at the end of the course-. Those students whose grades are commonly the highest continued performing at best standards. Few cases were observed in which students performed under their common grades –and those students recognized that they had not invest enough time and effort in developing the tasks-.

Related experiences and overall conclusions: A study on teachers' attitudes and approaches to education on biodiversity has been recently performed in the UK (Gaiford 2000), where suggestions for evaluating the possible indicators and outcomes of effective education were made. Other studies use interviews to explore the understanding of 12 practicing primary school teachers in four areas, biodiversity being one of such areas (Summers et al 2000). Taking into account the many recent studies found in the literature (Ciegis and Gineitien 2006, de Ciurana and Filho 2006, Arvai et al 2004, de Rebello 2003), it seems that promoting the learning of biodiversity-related contents in students who are being trained to teach science in primary schools is considered relevant. The work that we have presented here shows an effective strategy to develop critical thinking and problem-solving skills in students, as well as to develop the practical role of higher education for sustainable development. We assume that this is what Jerome Bruner

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(1996) referred to when he argued that the first object of the teaching-learning process, above and beyond the pleasure it may give, is that it should serve us (as a society) in the future.

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Annex 1. Questionnaire on Course Experience. Adaptation of the “Student Course Experience Questionnaire” (SCEQ), from the Institute for Teaching and Learning of The University of Sydney, conducted by the Autonomous University of Barcelona.

Questionnaire on Course Experience - A primer in Biodiversity Issues 2011-2012	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Learning					
I found the course intellectually stimulating					
I learned things that I consider valuable					
My interest on the field has increased as a result of this course					
I have learned and understood the contents of this course					
Enthusiasm					
The professor has been enthusiastic in teaching this course					
The professor has been active and dynamic in teaching this course					
Professors' lectures are enjoyable					
The professor's style makes it easy to pay attention along the whole lecture					
Organization					
The professors' explanations were clear					
Materials of the course were well-prepared and explained carefully					
It was easy to take notes on the professor's explanation					
Interaction with the group					
In this course students were encouraged to participate in discussions					
Students were invited to share their acknowledgement and ideas					
Students were encouraged to ask, and they were given satisfactory responses					
Students were encouraged to express their own ideas and to discuss those exposed by the professor					
Personal attitude					
The professor made me felt welcome when I asked for help					
The professor has shown sincere interest in every student					
The professor was adequately available for students out of lectures' time					
Contents					
The professor analysed, when necessary, alternative ideas to those exposed					
The professor introduced the origin or basis of the different concepts and ideas developed in lectures					
The professor presented points of view different from hers when necessary					
The professor discussed in a proper way the last advances in the matter					
Exams					
The professors' comments on examinations and practical works was of great help					
Methods of evaluation of this course are equitable and suitable					
The contents of examinations and other works corresponded to those of the course, and to the emphasis posed by the professor in everyone					
Other works					
The bibliography and other recommended material are complete and suitable					
The bibliography, additional material, and practical works, etc have contributed to improve the value and comprehension of the matter					
Difficulties					
This course has been: very easy, easy, normal, difficult, very difficult					
The amount of work for this course has been: very small, small, normal, big, very big					
The rythm of the course has been: very slow, slow, normal, rapid, very rapid					
On average, the amount of hours dedicated to this course out of the lectures have been: 0-2, 2-5, 5-7, 8-12, more than 12					
General vision					
This course is better than most of courses I have taken at this University					
This professor is better than most I have had at this University					
Other opinions on the matter and the course					
My level of interest in the matter before taking this course was: lower than 3, 3-5, 5-7, 7-9, more than 9					
My current level of interest in the matter is: lower than 3, 3-5, 5-7, 7-9, more than 9					
The final mark I expect is: lower than 3, 3-5, 5-7, 7-9, more than 9					
Which are the characteristics of this course/professor that have helped you more in the process of learning?					
Which are the characteristics of this course/professor that need priority improvement?					

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