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# Online training for a diversified audience: some achievements and some lessons learned

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## Summary

In this paper, we present the realizations of our team in the field of online training. Two categories of realizations may be considered: (i) series of online materials which constitute a consistent whole on a large topic (packages) and (ii) punctual materials on more focused topics. Some lessons are drawn from these experiences and we conclude that online training is a valuable tool which comes in addition to the work of teachers but does not replace it.

*Keywords: online training, animal breeding and genetics*

## Introduction

Our institution, namely AgroParisTech, provides with training at different levels of higher education: (i) curriculum for “*ingénieurs*” (from 3<sup>rd</sup> year of Bachelor to 2<sup>nd</sup> year of Master), (ii) Masters, (iii) PhD and, (iv) continuing education for people employed in various sectors (industry, extension services, academia, etc.). In addition, online training is under development in different fields covered by our institution.

In the field of animal breeding and genetics, our team contributes to all the above levels. Among other contributions, we coordinate 3 courses or programs: a 2<sup>nd</sup> year of MSc. course: Predictive and integrative animal biology (PRIAM) [1]; an International PhD program: European Graduate School in Animal Breeding and Genetics (EGS-ABG) [2]; a national continuing education course: Higher course in animal breeding (CSAGAD) [3]. The purpose of this paper is twofold: (i) to present our realizations and projects of online training, and (ii) to draw some lessons from these experiences.

## Online realizations in the field of animal breeding and genetics

### Contribution to an international French speaking network for online training

In 2007, a network of French speaking higher education institutions was created to develop an international online training platform, called GÉNET [4]. Currently, this network is coordinated by the University of Tours and comprises 11 higher education institutions from 5 different countries: France (7 institutions, including AgroParisTech), Benin, Burkina Faso, Switzerland, and Togo (1 institution each).

The field covered is genetics, i.e. all theoretical and applied branches of genetics. This field includes population, quantitative and molecular genetics, and animal breeding as well. Ethical and societal issues are also addressed. The main target is represented by students from the first year of Bachelor to the last year of Master. Indeed, by nature, the platform is

available to any people and, then, can also be recommended to PhD candidates, trainees in continuing education, etc. Since the aim of such a resource is to reach the larger audience as possible all the contents are delivered in open access.

The purpose of the network is to provide the students with any material that can help them to assimilate the concepts, tools and methods of genetics. The purpose is not to develop a full online course that can lead to award students with a diploma. Then, here are the materials available on the website: online training modules; tutorials; exercises with their solution; short videos; full texts (pdf); slides; glossary; frequently asked questions; etc.

## **Our own realizations**

N.B. In the text below, the level targeted is indicated by an initial (B = Bachelor, M = Master, PhD = doctoral course) plus, for Bachelor and Master levels, the year concerned.

### *Packages*

Here, “package” means a series of materials which constitute a consistent whole.

Our online course (B3/M1) in quantitative genetics [5] is divided in 6 chapters. For each chapter, students may find (i) a full text that can be downloaded, (ii) the answers to the exercises included in this text and, (iii) slides showing additional illustrations.

Our online basic course (B3) in animal breeding [6] is divided in 16 short chapters. For each chapter, a video plus slides are available. The video shows a teacher giving a (short) lecture and the slides are the support of the lecture. For three groups of chapters, a quiz allows students to benchmark themselves.

An online advanced course (PhD) in environmental genetics [7] is provided with the same tools than above (videos + slides), but without quiz.

Slides from a training course (B3), firstly intended to people working in extension services in Vietnam, are available [8].

### *Other realizations*

Other materials are available on various topics, as online modules, slides or samples of papers to be downloaded. However, these materials do not constitute a whole.

- 1) Kinship and inbreeding (B3/M1): concepts, computation methods, consequences for populations [9].
- 2) The halothane gene in pig breeding (B3) [10].
- 3) A simple model for selection against a recessive allele (B3/M1) [11].
- 4) Implementing genomic selection (continuing education) [12].
- 5) Estimating genetic gain (M1) [13].
- 6) The use of crossbreeding (B3) [14].
- 7) Ethical and societal issues dealing with animal breeding and genetics (B3/M2) [15].

## **Lessons drawn from our experiences**

Our first webpages for online training were created in 1998. From this time, we developed online tools but at irregular intervals. Our experiences allow us to draw some lessons.

Before developing online training, the purpose and the target must be defined accurately. Indeed, there is a gap in efforts between simply providing pedagogical material

and offering courses and evaluation tools allowing to award with a diploma. Moreover the size of the targeted audience must be taken into account when designing new online contents, in particular when they are interactive and thus need computing resources in terms of web server storage capacity.

Developing online training is highly time consuming. Our largest steps were performed when we were able to enrol people full time working on our projects. New development kits with simplified handling are regularly available but are quite expensive and not cross compatible. Thus a common solution must be chosen by all the teachers of a group that meets all their expectations.

There is a need to propose some up-to-date contents in particular in the fast evolving field of genetics in the era of genomics. Scientific knowledge is thus not enough to develop online modules that can be time consuming. Thus scientific survey must be coupled with a reactive team of web technicians, having a strong command of web pages design and development, in order to rapidly propose an appropriate content.

A feedback from users is required. It is hardly obtained in the absence of compulsory evaluation modules. Thus, even if the online content is proposed with an open access, it is feasible to ask for a mandatory registration to get a direct monitoring of the use of the platform and a feedback about it.

Finally and as a brief conclusion, we are convinced that social interactions and face to face exchanges between students and teachers are still required, and we believe that this need will remain for a long time. In particular practicals are necessary and need direct and live exchange with the teachers. Then we consider that online training is not a goal *per se* but is an additional element in the toolbox of teachers that will allow to get deeper in some topics and make courses more attractive.

## Referenced webpages

- [1] PRIAM (in French): <https://www.universite-paris-saclay.fr/fr/formation/master/m2-predictive-integrative-animal-biology-priam#presentation-m2>
- [2] EGS-ABG (in English): <http://www.egsabg.eu/>
- [3] CSAGAD (in French): <http://www.agroparistech.fr/Cours-Superieur-d-Amelioration.html>
- [4] GÉNET (in French): <http://genet.univ-tours.fr/>
- [5] Quantitative genetics (in French): <http://www.agroparistech.fr/svs/genere/uvf/GQ/GQintro.htm>
- [6] Animal breeding (in French): [https://tice.agroparistech.fr/coursenligne/courses/AMELIORATIONGENETIQUE/?id\\_session=0](https://tice.agroparistech.fr/coursenligne/courses/AMELIORATIONGENETIQUE/?id_session=0)
- [7] Environmental genetics (in English): [https://tice.agroparistech.fr/coursenligne/courses/ENVIRONMENTALGENETIC/?id\\_session=0](https://tice.agroparistech.fr/coursenligne/courses/ENVIRONMENTALGENETIC/?id_session=0)
- [8] Introduction to animal breeding (in English): <http://www.agroparistech.fr/svs/genere/uvf/AG/Prise-summary.htm>
- [9] Kinship and inbreeding (in French): <http://www.agroparistech.fr/svs/genere/uvf/GP/Phi/Phintro.htm>
- [10] The halothane gene (in French): <http://www.agroparistech.fr/svs/genere/uvf/AG/genes/haloth/haloth.htm>
- [11] Selection against a recessive allele (in French):

- <http://www.agroparistech.fr/svs/genere/uvf/GP/Select/recessif.htm>
- [12] Genomic selection (in French):  
[http://www.agroparistech.fr/svs/genere/ger\\_genetique/csagad/selgenome/selgenome\\_programme.htm](http://www.agroparistech.fr/svs/genere/ger_genetique/csagad/selgenome/selgenome_programme.htm)
- [13] Genetic gain (in French):  
[http://www.agroparistech.fr/svs/genere/uvf/AG/progres\\_genetique/proggen.htm](http://www.agroparistech.fr/svs/genere/uvf/AG/progres_genetique/proggen.htm)
- [14] Crossbreeding (in French):  
<http://www.agroparistech.fr/svs/genere/uvf/AG/croisement/croisemintro.htm>
- [15] Gén'éthique (in French):  
<http://www.agroparistech.fr/svs/genere/uvf/Genethique/ethique.htm>