Education Ambassadors Meeting Workgroup No 1 Report

"KEY KNOWLEDGE AND SKILLS EXPECTED FROM A MOLECULAR LIFE SCIENCES GRADUATE"

Paris Université Paris Descartes, France – April 7-8 2017

Workgroup attendees:

Jürgen ALVES; Marija G. JANKULOVIC; Pawel POMORSKI; Erkki RAULO; Revaz SOLOMONIA; Anat YARDEN; Jason PERRET (moderator) and Keith ELLIOTT (moderator).

Coordinators: Frank Michelangeli, Jason Perret & Keith Elliott

Aim: To co-operate on composing **an inventory for "Key Knowledge and Skills Expected from a Molecular Life Sciences Graduate"** for facilitating build a molecular life sciences curriculum which will help progress the career of a young graduate. An EU project would facilitate the co-operation and dissemination, but may not be realistic to achieve. The FEBS Ambassadors-on-Education network and FEBS Education platform could be used for developing the inventory. The skills should include, beside the practical skills, the "transferable skills", as well. The inventory would firstly cover the BSc degree and later may be extended to the high-school, MSc, and PhD degrees, as well.

Report of discussions:

Discussion on day 1 revolved around defining what a "bachelor" would require in terms of what "Key Knowledge and Skills Expected from a Molecular Life Sciences Graduate"; as the masters level seemed more obvious, but bachelors was a critical step as it followed high school training and was meant to establish the core knowledge needed.

The group discussion tried to define what a bachelor degree was in terms of what should a bachelor be prepared for; what should they attain at the end of a bachelor curriculum, what should the program contain and to what depth.

Rapidly it became obvious that, though the Bologna Process structure was adopted by most countries, the underlying organization, structure, content, curriculum length and prerequisites, i.e. in general the interpretation of the Bologna process was far from being the same from country to country and consequently is a major problem in terms of "harmonization".

Indeed, discussions revealed that bachelor degrees had different aims; i.e. some countries bachelor degrees would offer a degree *per se*, thereby allowing the bachelor to go directly out and apply for work, others did not offer a bachelor degree that could be used *per se* and the bachelor degree was just a prerequisite to move on to the masters level. Some countries offered both; where the bachelor's degree as a final degree was delivered by "technical school/higher education schools" and not by the universities; and the bachelor degree in the universities was just the prerequisite to continue on to the master degree.

Likewise, access to a PhD training was restricted to only master degree students in some countries, whereas in others access was made possible to both bachelor and master degree students.

The length of the so called bachelor's degrees could also vary from three to four years depending on countries. The end point requirements and length of high school training turned out to be also a factor influencing length and curriculum content.

Consequently, the depth of subject matters was also variable.

At the end of day one discussions, we agreed that we had to set some common ground to indeed address the aim of the workgroup's task, i.e. what "Key Knowledge and Skills Expected from a Molecular Life Sciences Graduate"; and define a "core" bachelor's degree" regardless of actual outcome and length.

Discussion on day 2, followed up on the conclusions of day 1. The workgroup discussions focused on core areas/subject matters that would be mandatory in all cases; e.g. Chemistry, math, physiques, biology and biochemistry. From there, the workgroup tried to understand what other skills such as certain transferable skills (report writing, basic scientific English, …), wet lab (pipetting, solution preparing, pH measuring, weight measuring, spectrophotometry, light microscopy, western blot, chromatograph and basic molecular biology techniques such as gel electrophoresis, plasmid preparations, restrictions reactions, basic PCR, …), as well as good laboratory practice (e.g. how to work in specific conditions (e.g. sterile, nuclease free). Likewise basic laboratory safety hazards and measures, handling biological materials, corrosive, toxic and flammable chemicals, their disposal,. They should also be informed about the work in specific (e.g. sterile) conditions and with techniques that are used to maintain those, should be part of bachelor training.

To what "depth" should subject matters go, was also discussed, i.e. ranging from "introduction to" to "advanced courses", considering a "generalist" bachelor program that would prepare for the different outcomes of the bachelor degree existing.

Outcome of discussion; follow up to achieve goals of the workgroup's aim(s):

The workgroup decided that it would be necessary to have an idea of the different bachelor degrees within various countries, in terms of: cursus aim (degree *per se*, preparation for masters, …), bachelor cursus length, content (what subject matters), credits of the subject matters, wetlabs (what subjects were illustrated by practical's, length/depth, laboratory skills acquired, …).

We agreed that this inventory does not have to be exhaustive but representative of the major differences. Then a core bachelor cursus "*a minima*" could be drafted.

The take away mission for the work group members was therefore to obtain the information concerning the bachelor degree(s) as organized in their respective countries.

Next would be to "overlay" these various bachelor programs and draft the core bachelor program. Indeed, we were all aware that obtaining substantial changes per country/university was not a realistic goal, and therefore a "minimal core curriculum" would be the most realistic proposal that could be made and implemented in the various countries and universities across Europe, considering the substantial differences and interpretation of the Bologna process.

To be noted:

1) **Jürgens ALVES** provided us with a very concise but informative brochure addressing curriculum content, subject matters, ventilated across different bachelor levels and master curricula.

The brochure was issued under Jürgens ALVES's auspice by the Hannover Medical School Institute of Biophysical Chemistry and is entitled: "***Outline of the Subject Matters required for the Acquisition of Bachelor and Master Level Proficiency in the Life Sciences***".

This brochure is an ideal example of what would be necessary to clarify what is being done across Europe.

2) **Keith ELLIOTT** sent, following our meeting, links to several ***UK*** documents centered on Life Science Curricula, entitled:
   a. *National Subject Profile for higher education programmes in: Biochemistry - 2008*
      Document 1
      (https://www.heacademy.ac.uk/system/files/biochemistryfinal.pdf)
   b. *Subject Benchmark Statement Biosciences - November 2015*
      Document 2 (http://www.qaa.ac.uk/en/Publications/Documents/SBS-Biosciences-15.pdf)

In this document pages 11-15 are of particular interest to the workgroup objectives.

These extensive documents cover many aspects of curricula, cohorts, outcomes, etc… and will be valuable aids for addressing the goals set by the workgroup.

Below, are copies of the Table of Contents, and the PDF files will be uploaded to the Education Platform.