

H3ABioNet Bioinformatics Curriculum Degree Development Workshop Report

Venue: University of Botswana, Gaborone

Date: 11th-12th March 2014

Participants

The meeting was organized by A/Prof Nicky Mulder from the University of Cape Town with support from Cashifa Karriem and Sumir Panji from UCT and Prof Wata Mpoloka and his colleagues from the University of Botswana. The H3ABioNet Education and Training Working Group's (E&T WG) Curriculum Development task force provided valuable input into the meeting agenda.

There were approximately 24 attendees from 17 different institutions from 12 countries, including Botswana, South Africa, Nigeria, Kenya, Tunisia, Zimbabwe, Ghana, Uganda, Tanzania, Sudan, Malawi and Switzerland.

Presentations

On the 11th March there were presentations from a number of attendees describing their experiences and challenges in setting up bioinformatics degree programs in Africa or Switzerland (Patricia Palagi). In addition, we had presentations via Skype from:

- Prof Oswaldo Trelles in Malaga on his experiences of cross-institutional degree programs from Malaga, Spain and South America
- Dr Mamadou Wele on the new bioinformatics program about to be implemented in Bamako, Mali
- Prof Lonnie Welch from Ohio, USA on the ISCB curriculum development activities

On the 12th March we had a presentation from Gomotsegang Pule, a member of the Centre for Academic Development and Programme Review Unit from the University of Botswana on the processes and considerations for setting up a new degree program.

Key issues from Gomotsegang Pule's talk:

- 1) Need and sustainability-** does the programme address issues of: Socio-economic needs of the country, Employment/self-employment, Programme currently available institution or others nearby, Student enrolment for at least first four intakes, Market research by the department
- 2) Alignment with the vision, mission, values and strategic plan of UB-** How does the programme support the university's vision, mission, values, strategic plan priority areas and equivalence of experience of all learners
- 3) Programme design factors-** these include the rationale for the programme, other programmes already being offered, consultation with other departments, career opportunities and professional accreditation bodies
- 4) Learning, teaching and assessment strategy-** details on the learning and teaching strategy, teaching methods, mode of delivery and materials development, academic support initiatives, monitoring student progress, evaluating programme impact and improvement, maintaining the quality of teaching and learning

- 5) **Student recruitment, admission and selection-** specify: admission requirements, selection criteria, recognition of prior learning, widening access and participation, and enrolment / student recruitment plan
- 6) **Prior Approval of the programme :** the academic programme must be approved by the University's governing structures at least one year prior to the first intake of students to this programme and should be factored into the timeline when establishing an academic degree programme

Presentations are available at:

<http://www.h3abionet.org/events/18-h3abionet-courses/h3abionet-courses-past/115-h3abionet-university-of-botswana-bioinformatics-curriculum-development-workshop-2014>

Topics for discussion

The remainder of the meeting was set aside for discussions on various specific topics.

What are the required outcomes?

We discussed reasons for setting up a degree program and what kind of people we want to train. Some may want to train bioinformatics scientists or bioinformatics engineers or both. The former are those who use computational methods to advance the scientific understanding of living systems, and should be comfortable with scripting and data manipulation using existing tools, while the latter create novel computational methods needed for scientific discovery. It is important to make it clear upfront what the desired outcomes of such a program are.

We collected information from all institutions present on who they want to train, how many students, when they plan to start and what human resources they have/need (<http://www.h3abionet.org/attachments/article/115/Degrees%20required.xlsx>).

What resources are required?

The most important is trained faculty to be able to teach courses and supervise projects, but also having the necessary IT infrastructure.

Teachers for coursework

- If you have the personnel, make sure they are up to date with current, high quality course materials
- If you don't have personnel in your department see if other departments at the university can contribute
- If nobody at the university can contribute, see if a partner university in same or different country is willing to help
- Look into the option of online courses
- If you want to have your own trainers, a program for training trainers is needed

Supervisors for projects

It is important to have faculty who can supervise bioinformatics projects. If there are no bioinformaticians in the department, this can be done by have a supervisor in a biology-related field and one in computer science (cross department or faculty). Alternatively one could have a main supervisor in the university and a co-supervisor who is trained in bioinformatics from another institution. Ideally while new programs are being established, an oversight board (Education

committee) should check the projects to make sure they really are bioinformatics projects suitable for a bioinformatics degree.

Training personnel for teaching

We could in the first instance get trainers to sit in during existing courses and assist with practicals. This could be short courses that are running in Africa or as part of existing degree programs.

*** Action item: need to have a website for listing such courses which would be open to having trainers sit in.**

Set up an African train-the-trainer program with e.g. EBI for core modules. This should include how to deliver training (lectures and practicals), how to develop and deliver content, etc. The main issue is time and cost of training, we could use video conferencing for classrooms for training trainers and for training trainers to facilitate students which provides real time interaction.

*** Action item: need to set up train-the-trainer program for core modules, approach EBI and others**

We discussed that teachers should have a thorough knowledge of the subject they are teaching rather than having just attended one course, so they should do additional reading. For each topic they should also have an overview of tools and provide a comparison of different tools. There should be a follow up support group.

*** Action item: Create a Website with support documents –teaching & assessment methods, philosophy of teaching (teacher development courses at universities) –check PLOSCB education track**

*** Action item: Create a survey to see who has trainers in each of the proposed modules and who needs trainers. This is available here:**

<https://docs.google.com/forms/d/12qiBsQAwkr0M4lhnZPq8OBtheKIG-JT4rmLsFMkuLys/viewform>.

E-learning

This is a possible alternative to not having trained faculty to teach courses. However, one would need to investigate the quality of online courses and whether they would be accepted/accredited by the university. Other issues are poor internet connection, so courses may need to be contained on a portable device.

IT facilities

It is important that the university has a computer training lab running Linux for the courses. Ideally the students should also have access to reasonable computing resources for their projects and be trained in the installing and running of bioinformatics software applications.

Accreditation

Each university will have its own accreditation processes for the individual courses. Accreditation would only become an issue for online courses or courses which are run by another university if a cross-institution model is being adopted. If a cross-institution model is being adopted, the various universities legal departments should also be informed to determine if the vision, outcomes, accreditation and administrative process are aligned between the various institutions in order to avoid any future disruptions to the programme.

Single versus multiple institution model?

In most cases single institutional models are best, and avoid the issues of who gets the fees and who gets the credits for graduations. However, in many cases one university does not have all the

required resources of either teachers or supervisors, therefore they have to share. This could still work in a single institution model, by the relevant institutions just agreeing to share their lecturers or co-supervise projects. Since the number of students expected is generally low (5-10), and the number of different subjects to cover is large, it makes sense to pool resources, especially in a resource poor setting such as Africa

Curriculum

We discussed a recommended curriculum in terms of core and elective modules. In some cases an elective model will become a core module if that is the research focus of a particular university. A summary of the core and elective modules and teaching hours is provided in a separate pdf document

(http://www.h3abionet.org/attachments/article/115/Core_elective_bioinfo_topics_curriculum.pdf).

The H3ABioNet E&T WG's curriculum task force will be expanded to include members from the meeting who are interested, and will work on developing more detailed content for each of the core modules.

Assessment and monitoring quality

It is important to regularly assess the students in different ways –the curriculum task force should suggest the most appropriate assessment method for each module – and to evaluate each module and the overall program. GOBLET (Global Organisation for Bioinformatics Learning, Education and Training (www.mygoblet.org) is working on standards and badges for monitoring quality of courses and lecturers, we can learn from them.

Students should also actively participate in journal clubs during their degrees and if possible, pair up with students from different backgrounds to theirs to foster a collaborative and communication culture.

Another important consideration is **retention**! Is there a career path for the graduates, e.g. bioinformatics jobs or PhD and lectureship positions to go into?

Summary of Key Steps for Starting a Degree Program:

1. Create awareness of bioinformatics at the university
2. Determine university requirements for degree programs
3. Survey students? Determine their desired outcomes
4. Engage extensively with all stakeholders possible to determine if one is not duplicating modules offered by other faculties
5. Put together degree structure
6. Determine whether you have the resources –trainers, supervisors, IT facilities or approach other universities to share resources
7. Train your faculty
8. Propose degree to university via a curriculum submission. Await outcome of the results of the curriculum submission from University management structures to assess if the curriculum is successfully accepted or further work needs to be done

An important consideration when starting a degree programme is to engage with an Institution's academic development and review unit from the outset as they will provide invaluable assistance when creating an academic programme to be reviewed by the institutional management.

*** Action item: Put spreadsheet up on a site with the list of steps so that each institution can fill in when they started and completed each step.**

***Action item: Form an African Bioinformatics Education Committee**

Composition: One representative from each institution who does or wants to do bioinformatics education

Create task forces for each specific “deliverable”

- 1) Curriculum development (H3ABioNet E&T WG CD task force)
- 2) Organise train-the-trainer program

Role of committee:

- Provide general support for bioinformatics degrees
- Provide website with materials (teaching methods, course materials, administrative forms)
- Organise train-the-trainer program
- Monitoring quality of courses and assessing relevance of projects
- Facilitating cross-talk between programs and institutions
- Identify current trends in bioinformatics education
- Link with GOBLET and other education initiatives
- Create directory of programs and trainers (possibly with assessment)
- Create directory of possible supervisors and their areas of expertise
- Create a tracking mechanism to see how long it takes for a University to put together their curriculum submission proposal, have their degree programme accepted and factors which enable the successful acceptance of a degree programme by their institute

Follow up meetings:

Late April or early May, then committee should meet every 6 months by Skype.