Data literacy in biological sciences

State of the art

Biological sciences are more and more driven by large scale data acquisition and analyses projects. These include but are not limited to metabolomics, proteomics, transcriptomics and genomics datasets.
At the same time, most students have not been taught to use programming languages like bash, R and python routinely for their analyses in school or in their initial courses during studying.
Within this project, we develop a self-study course as an introduction to programming for biology students. The course is designed to be self-taught to enable skill acquisition outside of traditional classes.

The project

Three programming languages were chosen for the course: bash, R and python. The course is designed around problems in biology with immediate access to interesting results relevant to the course of study

➢ *The bash module was tested in MM3 of the Molecular and Cell Biology Master program and MM1 of the Genome Based Systems Biology Master program*
➢ *The R module was tested in MM3 of the Molecular and Cell Biology Master program and MM1 of the Genome Based Systems Biology Master program*
➢ *The python module remains untested*
➢ *All three modules have been used an introduction to programming for PMs and FMs*

Results

➢ *Effective modules for self-teaching have been developed for two out of three languages*
➢ *Data availability and compute cluster access are hurdles to a wide role-out of the course*
➢ *Original evaluation was abandoned due to university lock downs.*
➢ *Effectivity was tested in pandemic-related at home classes usually taught in a class room followed by group projects; students mostly requested cookie cutter solutions for problems „to check their progress". This was taken as evidence for a result-related rather than progress-related approach*
➢ *In the future, an introduction to the process rather than result-oriented nature of the course needs to be added to better communicate the goals („Lernziele")*

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Clearly communicate the course goals/ project goals („Lernziele") to the students

Check available resources and ease of access for students
Check for potential infrastructure issues